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Improving Understanding of Alcohol Impairment and BAC Levels, and Their Relationship to Highway Accidents

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<p>16. Abstract</p> <p>This report summarizes work completed on an extensive analysis of the attitudes of the judicial community (judges, prosecutors, and potential jurors) toward alcohol's impairment of driving abilities; and in the preparation of educational materials for dissemination to this community.</p> <p>Tasks completed under this contract included the conduct of two literature reviews: one of the experimental literature on the effects of alcohol on skills related to driving ("Effects of Low Doses of Alcohol on Driving-Related Skills: A Review of the Evidence"); and the other addressing behavior, knowledge, and attitudes toward driving while intoxicated ("Review of the Literature on Drinking and Driving Behavior Knowledge About Alcohol, and Attitudes Toward Driving While Intoxicated").</p> <p>Two educational documents were developed as part of this effort: the scientifically-oriented booklet, "Alcohol Impairment and Its Effects on Driving" and the general audience pamphlet "Every Drop Counts."</p>			
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EXECUTIVE SUMMARY

The definition of driving while intoxicated is of primary importance to the detection, prosecution, and adjudication of DWI statutes. Most states have set one or more blood alcohol concentration (BAC) levels defining the offense of driving while intoxicated.

Scientists and legislators have recognized the usefulness of BAC in defining the point at which a person becomes a danger when driving. However, observation and reports of behavior are the traditional way that society determines drunkenness. The gap between the scientific perspective, which asserts that a driver at 0.10% BAC is too impaired to drive safely, and common opinion, which holds that only "drunks" are dangerous, may account for the significant number of DWI cases that are reduced to lower charges or dismissed.

The research carried out under this contract was directed toward assessing the perceptions of participants in the judicial process (judges, prosecutors, and potential jurors) regarding alcohol and driving safety and to designing educational materials for conveying correct information to these audiences. Four objectives were set forth in the contract:

- o To document the findings of a literature review effort covering the impairment effects and accident risks at various BAC levels;
- o To document the perception of judges, prosecutors, and potential jurors regarding what constitutes dangerous impairment conditions on the highway due to alcohol ingestion;
- o To document the information and appeals (messages) devised to improve the appreciation among these groups of the impairment dangers attendant to various BAC levels, including tests of message effectiveness; and
- o To develop recommendations regarding effective materials and their use.

Two literature reviews were conducted. The first review explored the current state of knowledge with regard to alcohol impairment and driving, with particular emphasis on impairment at low blood alcohol concentration (BAC) levels. Herbert Moskowitz, a noted expert in the field of alcohol and driving, was the principal author of this review. The review was co-authored by Christopher Robinson of the Swinburne Institute of Technology, Melbourne, and is entitled "Effects of Low Doses of Alcohol on Driving-Related Skills: A Review of the Evidence." Moskowitz and Robinson placed the extensive experimental literature on alcohol effects into a common perspective of translating all dose information into a single format--that of blood alcohol concentration. A total of 557 studies were reviewed, of which 178 provided sufficient methodological information to be included in their analysis. The Executive Summary of the Moskowitz and Robinson paper is included as Appendix A of this report. The report in its entirety is available under separate cover.

The second literature review, conducted by SRA staff, explored the information available on drinking-driving behavior, public knowledge about alcohol, and attitudes toward driving while intoxicated. The review of public attitudes was used as a resource in determining the specific topics explored in the assessment of the perception of participants in the judicial process with regard to alcohol and driving safety. This report, entitled "Review of the Literature on Drinking and Driving Behavior, Knowledge About Alcohol, and Attitudes Toward Driving While Intoxicated," is included in its entirety as Appendix B of this report.

The focus group methodology--a qualitative research technique that relies upon a structural discussion among a group of respondents--was used to probe attitudes among judges, prosecutors, and potential jurors. Based on the results of this methodology, a scientifically-oriented booklet was prepared for dissemination to judges and prosecutors. This booklet was tested on judges and prosecutors during a second round of focus groups, and extensively revised. The final booklet is provided in Appendix C of this report.

Using the revised material in the booklet, an abbreviated version was assembled in pamphlet form for dissemination to the general public. The pamphlet was tested on potential jurors, again utilizing focus groups, and was revised in accordance with participant response. The final pamphlet is provided in Appendix D of this report.

CHAPTER I: PURPOSE OF CONTRACT

Alcohol consumption is the most important single factor associated with fatal crashes on the highway. Approximately 25,000 deaths per year stem from alcohol-related accidents. Blood alcohol levels sufficient to cause impairment are found in 50 percent of fatally injured drivers and in 30 percent of fatally injured adult pedestrians.

Strict enforcement of laws prohibiting driving while intoxicated (DWI) can reduce traffic casualties in that it may inhibit the behavior by increasing the perceived risks faced by the intoxicated driver, i.e., the risk of being caught in addition to the risk of being in a crash. Strict enforcement involves a combination of detection, prosecution, and sentencing of the DWI offender. Campaigns which have increased the severity of enforcement by increasing the severity of one or more of the enforcement stages have had demonstrated effectiveness.

- o Enforcement of and public education about the 1967 British Road Safety Act, which allowed police to administer a breathalyzer test (increased detection) and mandated a year-long license suspension for blood alcohol content (BAC) of 0.08% or above (increased sanctioning) resulted in a two-thirds drop in weekend nighttime casualties (Ross, 1973).
- o In Scandinavian countries, which have severe sanctions for DWI, alcohol-related traffic accidents are very low. Only four percent of fatal accidents in Norway involve drunk driving (Andenass 1966, Ross 1975).
- o In a California experiment, license suspension or revocation in conjunction with fines and jail sentences were found to be superior to fines alone in reducing repeat arrests for DWI nearly four years after the initial conviction (Hagen, McConnell and Williams 1980).

The definition of driving while intoxicated is important to the detection, prosecution, and adjudication of DWI statutes. Most states have set one or more blood alcohol concentration (BAC) levels defining the offense of driving while intoxicated. Depending on the type of legislation in effect in the state, a particular BAC level (generally, 0.10%) may create a presumption of intoxication, which then must be corroborated by other evidence; or it may constitute a violation in and of itself (per se).

Scientists and legislators have recognized the usefulness of BAC in defining the point at which a person becomes a danger when driving. However, observation and reports of behavior are the traditional way that society determines drunkenness. The gap between the scientific perspective, which asserts that a driver at 0.10% BAC is too impaired to drive safely, and common opinion, which holds that only "drunks" are dangerous, may account for the significant number of DWI cases that are reduced to lower charges or dismissed. Even where per se legislation is in effect, the common perception of "drunkenness" may play an important role in shaping the decisions of judges, prosecutors, and juries with regard to DWI offenders.

The research carried out under this contract was directed toward assessing the perceptions of participants in the judicial process (judges, prosecutors, and potential jurors) regarding alcohol and driving safety and to designing educational materials for conveying correct information to these audiences. Four objectives were set forth in the contract:

- o To document the findings of a literature review effort covering the impairment effects and accident risks at various BAC levels;
- o To document the perceptions of judges, prosecutors, and potential jurors regarding what constitutes dangerous impairment conditions on the highway due to alcohol ingestion;
- o To document the information and appeals (messages) devised to improve the appreciation of these groups of the impairment dangers attendant to various BAC levels, including tests of message effectiveness; and

- o To develop recommendations regarding effective materials and their use.

The chapters that follow document each of these four efforts in summary form. More extensive detail has been provided in interim contract reports.

CHAPTER II: LITERATURE REVIEWS

The contract specified that two literature reviews be conducted as a guide to subsequent assessment of attitudes and materials development.

The first review explored the current state of knowledge with regard to alcohol impairment and driving, with particular emphasis on impairment at low blood alcohol concentration (BAC) levels. At the direction of NHTSA, the principal author of this review was Herbert Moskowitz, a noted expert in the field of alcohol and driving, who produced the report under subcontract to SRA Technologies, Inc. The report, jointly authored by Moskowitz and Christopher Robinson of the Swinburne Institute of Technology, Melbourne, is entitled "Effects of Low Doses of Alcohol on Driving-Related Skills: A Review of the Evidence." Moskowitz and Robinson placed the extensive experimental literature on alcohol effects into a common perspective by translating all dose information into a single format, that of blood alcohol concentration. A total of 557 studies were reviewed, of which 178 provided sufficient methodological information to be included in their analysis. The Executive Summary of the Moskowitz and Robinson paper is included as Appendix A of this report. The report in its entirety is available under separate cover.

The second literature review, conducted by SRA staff, explored the information available on drinking-driving behavior, public knowledge about alcohol, and attitudes toward driving while intoxicated. Knowledge of all of these areas was deemed pertinent to the design of methods for exploring current attitudes toward alcohol and driving safety. The review of public attitudes was used as a resource in determining the specific topics to be explored in the subsequent contract task: the assessment of perception of participants in the judicial process with regard to alcohol and driving safety. This report, entitled "Review of the Literature on Drinking and Driving Behavior, Knowledge About Alcohol, and Attitudes Toward Driving While Intoxicated" is included in its entirety as Appendix B of this report.

CHAPTER III: PERCEPTIONS OF JUDICIAL PARTICIPANTS

A crucial step in improving understanding of the danger posed by driving under the influence of alcohol is ascertaining current attitudes, knowledge, and beliefs regarding this issue. Task 3 of the contract called upon SRA to "determine those perceptions of judges, prosecutors, and potential jurors which are critical to judgments about alcohol-induced impairment in the driving area, and to obtain/confirm information on ways and means of getting information to these parties for the purpose of changing these perceptions."

A. METHODOLOGY

It was decided early in the contract period that focus groups would be used to probe attitudes among judges, prosecutors, and potential jurors with regard to alcohol and driving. Since the focus group methodology was also utilized in testing the actual materials developed under this contract, the first focus group interviews became known as "Round I." The focus group is a qualitative research technique which relies upon a structured discussion among a group of 10 to 15 people, led by a moderator. The moderator guides the discussion following a pre-determined topic outline, while facilitating interaction among group members. The ensuing discussion is analyzed to identify major themes and concerns surrounding an issue or product. Follow-up by the moderator can explore reasons behind opinions and attitudes. Because the group discussion is not rigidly structured, it is well suited to exploratory research into knowledge and attitudes.

Different recruiting procedures were employed to obtain the cooperation of judges, prosecutors, and potential jurors. The National Judicial College (NJC) in Reno, Nevada was approached in order to obtain a geographically dispersed group of judges. The NJC, sponsored in part by the American Bar Association and located at the University of Nevada, Reno, provides instruction for newly elected or appointed judges and continuing education for established judges. Its two- to three-week courses are attended by judges from around the country. The NJC agreed to organize volunteer judges from

among its attendees for participation in the focus group and provided meeting rooms. A focus group of 11 judges was held on April 25, 1986. These judges represented both per se and presumptive states and urban and rural districts.

The State's Attorneys Coordinator for the State of Maryland was contacted to assist in recruiting group participants for the focus group for prosecutors. He put SRA in contact with a number of prosecutors who would be attending a National District Attorneys Association meeting being held in the Washington metropolitan area. Sessions were conducted over lunch to minimize the disruption to the attorneys' schedules; a modest honorarium was provided. Three attorneys attended a session on April 29, 1986; 4 attended a session held on May 6, 1986. All but one of the participants were chief prosecutors for their districts and set policy that influenced the behavior of attorneys working under them. While both urban and rural districts were represented, all but one of those participating came from Maryland or Virginia. No per se states were represented in the group. Although only three states were represented at the sessions, discussions suggested that enforcement of DWI laws can vary from district to district almost as much as from state to state.

Participants for the potential juror focus groups were recruited in the metropolitan areas of Baltimore, Maryland and Richmond, Virginia by a professional market research firm. The screening criteria that were used precluded disproportionate shares of unemployed persons and those who never drink alcoholic beverages, and achieved a reasonable age distribution among participants. Persons who had personal experience with a DWI incident were excluded since such individuals would be challenged during jury selection. Anyone with recent focus group experience was rejected to eliminate "professional" focus group participants. Each group was limited to members of the same sex to encourage a more open exchange of views. The age, employment status, and drinking behavior of the group participants were ascertained. There were no sharp differences in characteristics between the groups in Baltimore and those in Richmond. Nearly all participants were employed and said they do drink alcoholic beverages.

B. FINDINGS

The literature review on attitudes was explicitly designed to identify key attitudes and behaviors that should be explored in depth within the focus groups. While the general topics covered were the same for professional and potential juror groups, detailed questions were refined to reflect their differing roles in a DWI case. For example, judges and potential jurors were asked their verdict in a sample DWI case, while prosecutors were asked whether they would prosecute the case.

The following sections present the results of focus group interviews organized by the major topic areas. The viewpoints of judges, prosecutors, and potential jurors are presented simultaneously, and agreement or disagreement within these groups is noted.

1. The Difficulty of Driving

Judges, prosecutors, and potential jurors expressed similar attitudes with regard to the difficulty of driving. The first response was to say that driving is easy. Pressed to reflect on the physical and mental skills involved, respondents often stated that driving is difficult to learn, but quickly becomes a habit. The ease of driving, in fact, was identified as a problem: tedium or boredom were noted as threats to alertness. The most difficult aspect of the driving task was seen as the need to be prepared to cope with any situation that might arise. Chief among possible dangerous situations was the unpredictable actions of other drivers, with poorly designed roads and dense traffic also often cited.

Given the perception, common to all groups, that driving is a simple task, an educational approach emphasizing the physical difficulty of driving would lack credibility. Educational approaches will communicate more effectively by stressing the role of alcohol in reducing ability to deal with sudden dangerous situations, as these are commonly perceived as real threats.

2. General Effects of Alcohol

One of the major issues explored in the focus group discussions was the visible effect of alcohol on individuals. All participants reported having observed people who were "feeling the effects of alcohol" at one time or another. Participants were asked to list those behaviors that came to mind. The lists showed that there is a common set of behaviors that our culture ascribes to drunkenness including slurred speech, loudness, fumbling, stumbling, obnoxiousness, personality change, lack of coordination, bragging, falling asleep, being physically ill, and decreased inhibition.

Groups were also asked to rank the behaviors, that is, to note which effects of alcohol might appear first, after the individual had consumed only a little alcohol, which might appear after a moderate amount of alcohol, and so on. Although many of the behaviors appear in all lists, the order in which participants believe they occur varied somewhat. For instance, "slurred speech" was mentioned by someone in nearly every group; yet there is no consensus regarding where it falls in the ordered range of behaviors. The Baltimore and Richmond women felt it was an early sign, the first prosecutors group thought it was a middle stage behavior, and the Richmond men and the judges saw it occurring much later. "Lack of coordination" was designated as an early sign by some, but as happening in the middle stages by others.

A recurring theme in all the focus group discussions was that individuals tolerate alcohol differently. Some participants expressed this in terms of variation among different people; others felt that the same person would tolerate alcohol differently given certain conditions. Factors cited as affecting tolerance included metabolic rate, amount and frequency of drinking, temperament, time of day, fatigue, amount of food one had consumed, frame of mind, type of alcohol being consumed, physical health, and age.

While subscribing to the notion of tolerance, most participants were still able to focus on the general effects of alcohol. It was generally agreed that some people who show none of the signs listed above probably are still

affected by the alcohol but, for a variety of reasons, are able to conceal any outward signs.

Despite the fact that discussants believed in varying tolerance levels for alcohol, there did emerge certain explicit references to alcohol's physiological impact; that, whether or not one could conceal the effect, it nevertheless is present.

3. Drinking and Driving

After discussing the general effects of alcohol, the groups moved to the issue of driving after drinking. Participants were asked at which point on the list of alcohol-related behaviors they would consider it unsafe for a person to drive. There was no clear consensus on behavioral indicators that a person was too impaired to drive. The two behaviors most frequently associated with impairment, however, were lack of inhibition as a result of drinking, which was thought to lead to careless driving, and overt loss of physical coordination.

There did appear to be at least a degree of acceptance of drinking and driving evidenced by those who believe some can compensate for the effects of alcohol and by those who said, in essence, that the amount of impairment resulting from alcohol consumption depends on the circumstances. The probabilistic nature of the hazard posed by drinking and driving--not every occasion will result in harm--may explain a certain acceptance of this behavior that emerged in potential juror focus groups.

4. Legal Aspects of Driving While Intoxicated

Participants knowledge of and reaction to the legal definition of driving while intoxicated was explored in some depth. This included examination of the following areas:

- o Knowledge of the legal definition itself. This area of inquiry was only explored with potential jurors.

- o Understanding of the general amount of alcohol consumption required to bring an "average" person to the legal limit.
- o Perception of the likely condition of the person who had consumed sufficient alcohol to render him or her legally intoxicated.
- o Driving ability of a legally intoxicated individual.

Judges and prosecutors, as anticipated, showed a general familiarity with the amount of alcohol required to reach legal intoxication for purposes of driving. Focus groups of potential jurors, however, offered a range of answers suggesting that a number of different ideas are encompassed by the term "legally intoxicated."

Two common misunderstandings about alcohol consumption were voiced in the focus groups: the notion that beer and wine are less intoxicating than liquor and the concept that certain foods prevent intoxication. The idea that alcoholic beverages other than liquors are somehow less intoxicating even arose in discussions with prosecutors. Certain foods are seen to prevent intoxication or to prevent the detection of alcohol by a breathalyzer. The principal effect of such misconceptions is probably to increase the alcohol consumption of the individuals who subscribe to them.

At all focus groups participants were asked to describe the probable condition of an individual (a 170-pound man) who had consumed sufficient alcohol to render him intoxicated (defined as 7 drinks in 2 hours in the 0.10% BAC state, 8 1/2 drinks over the same period for the 0.13% BAC state).

Groups were not comfortable characterizing someone's behavior solely on the basis of his alcohol consumption. Some respondents felt that anyone who had consumed the amount of alcohol indicated would clearly be intoxicated, while others felt that experienced drinkers would not be visibly affected.

The idea that each person reacts differently to alcohol is common. Many participants felt that metabolism affects the reaction to alcohol. In addition to noting that different individuals will show their consumption in

different ways, respondents also noted that mood will affect an individual's response to alcohol.

Discussion of the condition of a legally intoxicated individual was narrowed to focus specifically on driving ability. Could that person drive safely? As was the case with predicting the individual's visible condition, a consensus did not emerge from any of the groups. While there was agreement that the person would be impaired, there was disagreement concerning the importance of that impairment for the driving task.

Many respondents were unwilling to state that all people would be equally impaired when legally intoxicated because of a belief that some, or even most, people can compensate for alcohol's effects if they wish. The importance of driving is similarly seen to have a sobering effect. Serious demands--sudden illness, for example--were seen as motivating the individual to stop being intoxicated. Many respondents expressed the notion that by taking particular care in their driving they could minimize the risks posed by alcohol.

The fact that a particular position with regard to alcohol and driving has been embodied in law has a persuasive effect in and of itself. Depending on how the law is interpreted by the individual, that persuasive effect may argue for or against acceptance of a given BAC level as a measure of impairment.

The force of law was also called upon by the legal professionals to support the notion that not all individuals will be sufficiently impaired at .10 BAC to preclude safe driving.

5. Evidence of DWI

Both potential jurors and judicial professionals were asked what general types of evidence are used in DWI cases. Respondents were asked first what driving behaviors they believed might lead a police officer to stop a driver on suspicion of DWI and whether they believed police officers are generally correct in choosing drivers to stop. These questions were aimed at assessing

respondent confidence in police officers' judgement relating to DWI arrests and was included because of the importance of officer testimony in DWI cases.

Respondents also were asked what type of field tests police officers routinely perform on DWI suspects (excluding the breath test); and were asked whether they considered such tests accurate measures of intoxication. The questions were selected because officer testimony concerning a suspect's performance on field sobriety tests forms part of the evidence in DWI cases.

Focus group participants named a number of behaviors that they believed would lead police officers to stop drivers on suspicion of DWI including inappropriate speed, erratic driving, weaving, wide turns, improper lane changing, and failure to use signals or to have lights on. Time of day was also noted as playing a factor in stopping a person on suspicion of DWI since late night was believed to be prime time for DWI.

Judges, prosecutors, and potential jurors expressed confidence that police judgement concerning possible DWI suspects was generally correct. While several potential jurors described occasions on which they or an acquaintance had been stopped erroneously on suspicion of DWI, in all but one case the individual noted that the police officer had acted after observing an unusual driving behavior on the part of the person stopped. A prosecutor noted that his office monitors the BAC levels of those stopped and finds few, if any, cases in which the individual does not have a BAC level in excess of the legal limit.

Members of all focus groups were knowledgeable concerning field tests, other than the breathalyzer, conducted by the arresting officer in an attempt to determine whether a person is or is not intoxicated. Tests named by participants included walking a straight line, reciting the alphabet, standing on one leg, and touching your nose. Other signs that might be noted by an officer included the smell of liquor, slurred speech, and fumbling for the drivers license or automobile registration.

Prosecutors also were aware, as potential jurors were not, of the horizontal gaze nystagmus test and of the preliminary breath test. A "balloon test," however, was mentioned by one potential juror. Only one prosecutor reported using the nystagmus test as evidence of intoxication, and stated that it was not judged to be adequate proof. Others had no experience using it for evidentiary purposes, but were aware of or had participated in training programs where it was discussed.

Responses to the question regarding whether field tests can actually measure intoxication were ambivalent. Respondents showed both a belief in such tests as accurate indication of intoxication and the feeling that a person could fail the tests while not intoxicated.

Prosecutors and judges were asked how they thought field tests compared to the BAC in terms of accuracy. Responses were divided.

6. BAC Testing

The breathalyzer is crucial to enforcement and adjudication of driving while intoxicated laws. In per se states, the indication of blood alcohol content provided by the breathalyzer is evidence of guilt; in presumptive guilt states, it is a strong piece of prosecution evidence. It was found that prosecutors and judges approached the accuracy of breathalyzer technology from different points of view than did potential jurors. Prosecutors and judges responded to questions on breathalyzer accuracy from the perspective of its usefulness in determining guilt; potential jurors responded from the perspective of someone apprehended for the offense.

Prosecutors, who rely on breathalyzer evidence in determining who is to be prosecuted for DWI and subsequently as part of the state's case against the individual, expressed considerable confidence in the accuracy of breathalyzer results. Prosecutors were unanimous in their support of breathalyzer technology. None suggested that operator or machine error might significantly degrade the ability of the breathalyzer to yield a blood alcohol reading sufficiently accurate for prosecution purposes. Judges, who are frequently

exposed to expert testimony from both sides, qualified their answers, but were generally supportive of the accuracy of the breathalyzer.

Potential jurors offered a range of responses: confusion about the technology of the breathalyzer, concern about the accurate calibration of such machines, and occasional suspicions of police manipulation of breathalyzer results. Potential jurors were considerably less confident than prosecutors and judges in the accuracy of the breathalyzer. They were not familiar with the technology involved and they appeared to extrapolate concerns about machinery in general and about other law enforcement devices (such as the radar gun) to the breathalyzer. The concept that any device can err also arose.

Following the general discussion of the degree of intoxication an individual might exhibit at a 0.10% (or 0.13%) BAC, judges and prosecutors were asked whether they themselves agreed with the legal definition of DWI. Several of the judges and all of the prosecutors came from presumptive states; thus most respondents were being asked whether, in their opinion, a 0.10% BAC level created a supportable presumption of intoxication rather than a per se definition of intoxication.

There was general agreement that the 0.10% BAC was an acceptable level for defining driving while intoxicated. No one advocated revising the limit upward; one judge suggested that it be lowered. (This judge, unlike the others, did not hear DWI cases on a daily basis.) It is worth noting, however, that support for the general use of 0.10% BAC did not uniformly stem from sensitivity to scientific evidence as regards DWI, but from a consideration of law. Because of the variety of cases they see, judges and prosecutors were aware that response to alcohol will not be uniform. However, they believe that it is in the best interests of society to determine a point at which a potentially dangerous behavior becomes sufficiently threatening to marshal society's resources against it.

Focus groups of prosecutors were asked what the BAC level meant to them: did it give them any unequivocal information about the suspect's condition? For these officials, all of whom represented presumptive states, the BAC level is

seen as an accurate measure of the suspect's amount of alcohol consumption, but is not seen as a definitive statement of the suspect's condition or driving ability.

7. Sample Case

Focus groups were asked to react to a sample DWI case. The sample scenario was constructed to make the case rely as much as possible on BAC level alone while still establishing a credible reason for the police officer to have stopped the driver.

Judges' response to the sample case focused more on the disposition than on the verdict. When asked to assume that the sample case took place in a per se state, the judges agreed that the suspect would be guilty. In a presumptive state, some judges noted a "reasonable doubt" based on the limited evidence available in the sample case.

There was considerable discussion of how the judges would sentence the individual charged. Most felt that more information would be needed before they could answer. One would want to know the man's "age, family background, work history and record, educational background, psychological profile." Others said that they would need to know if this was a first offense and would act differently if so. One argued that "fairly stiff minimum sentences" are needed, even for the first offenders. Overall, most indicated there was insufficient information presented on which to base a decision.

Prosecutors were divided on whether they would prosecute the sample case. (As stated earlier, all were from presumptive states.) Those who said they would prosecute believed they would reduce the charge or lose the case. It was considered likely that the defendant would receive probation or supervision, perhaps in an alcohol or drug therapy program. Some prosecutors said they would need more information to make a decision, such as whether this was a second DWI offense, or some indication of erratic driving.

Potential jurors were equally perplexed at the lack of information in the case. However, many pointed to the fact that the driver's BAC level was above the legal limit as a reason for saying they would find him guilty. For some, the BAC level alone was not enough for a finding of guilty.

Many members of the potential jurors focus groups believed the defendant was guilty but showed some sympathy based on the lack of traffic violations. Potential jurors who favored lenient sentencing for the defendant stressed that the DWI offense should form a permanent part of the driving record. Recommendations for light sentencing assumed that a first offense could be forgiven, but that subsequent offenses should be dealt with harshly; an adequate record was seen as necessary for identifying second offenses.

When asked if it would affect their opinions if the defendant in a DWI case had refused to take a blood alcohol test, most potential jurors said yes, indicating that this implied guilt. A minority felt that refusal of the breathalyzer based on lack of faith in its accuracy was justified. Police evidence in a DWI case, in the absence of a BAC level, was believed by potential jurors to be enough for a guilty verdict.

When asked what they thought a judge would do with the sample cases, as originally presented to them, potential jurors were divided; some saying a judge would grant probation or some alcohol-related educational activity, and others saying the defendant would be found guilty.

8. Judicial and Prosecutorial Fairness

Discussions with judges and prosecutors included a brief examination of two potentially sensitive areas: the possibility that judges and prosecutors might be lenient with DWI "because it is something that anybody, themselves included, might do, unlike violent crime;" and the question of whether judges and prosecutors understand the impairment to driving caused by alcohol.

Judges acknowledged that personal habits might incline a judge to be lenient with DWI. Both judges and prosecutors pointed to two factors perceived to be

far more influential than the judges' or prosecutors' own behavior: the intimacy of small communities (a factor motivating leniency) and the recent public interest in DWI (a factor motivating strictness). The fact that personal acquaintance with a defendant can influence prosecution or judgement was noted.

Recent public outcry over drunk driving was seen as by far the largest influence on judicial system behavior. As elected officials (in most cases) judges and prosecutors recognize the need to be responsive to public opinion. The current furor over DWI, when translated into mandatory sentencing legislation, was seen by both judges and prosecutors as removing the judge's discretion in DWI cases and placing that discretion at the level of the prosecutor or even the individual policeman who decides how to write up a ticket. In the eyes of judges and prosecutors, this is an usurpation of their role and an adverse effect of public interest in DWI.

Both judges and prosecutors expressed the belief that, in general, members of their profession have an adequate understanding of the implications of alcohol consumption for driving. Prosecutors distinguished between experienced and inexperienced attorneys. Inexperienced attorneys--and these are the individuals most frequently assigned routine tasks such as DWI cases--were recognized to need guidance.

9. Advice and Recommendations

At the end of each focus group session, participants were asked their advice with regard to communicating information on alcohol and its effect on driving ability. The responses of judges and prosecutors were of particular interest, as educational materials for these groups form the principal output of this contract.

Discussion of the form that educational materials might take yielded no consensus. Several judges recommended filmed demonstrations of alcohol's effect on driving performance, citing the dramatic nature of such materials. One prosecutor, however, had apparently seen such materials but not been

convinced by them. A different point of view emerged with regard to written materials on alcohol and driving that might be prepared. One judge, for example, stated "I am concerned about the amount of reading that I have to do just to do my job," indicating that he was not interested in more written material, while another preferred written materials: "I had rather have something in my office I can refer back to."

A lack of consensus on the best format for communicating a particular message was not unanticipated: different people prefer to acquire information in different ways. The lack of consensus argues for the development of a message campaign that repeats basic information concerning alcohol and driving in a number of different formats and at a number of different levels of technical detail.

As was the case with formats, there was no universal publication that all judge and prosecutor respondents agreed was their principal source of information. While some recommended American Bar Association publications as widely read, others noted that they had stopped taking ABA publications.

One point of agreement that did emerge was the importance of state bar associations and state publications to judges and prosecutors. Legal professionals within a state need to be familiar with legislative actions and case law within their state; thus, they obtain and study a variety of state publications. State associations also were recommended as potential locations for training sessions devoted to alcohol and driving.

A common technique in government-sponsored educational campaigns is the use of intermediary groups: groups that can be persuaded to use some of their prestige and resources conveying messages to their members or constituents. The American Academy of Pediatrics, for example, vigorously supports the use of child care restraints. As with sources for professional journals, there was general agreement that the state bar or state associations of prosecutors or judges would be of greater importance to professionals than the larger American Bar Association. Respondents vigorously noted that materials on alcohol and driving endorsed or distributed by citizens' groups such as

Mothers Against Drunk Driving would not meet with widespread acceptance. MADD and similar groups are seen as advocates rather than as impartial sources of information.

C. CONCLUSIONS

1. Conclusions Pertaining to Judges and Prosecutors

Judges and prosecutors, in the main, were knowledgeable about all aspects of drinking and driving. Unlike potential jurors, legal professionals understood the amount of alcohol required to reach DWI-related BACs and were familiar with breath analysis technology. Respondents stressed, however, that newly-appointed prosecutors or judges might not display the same level of expertise. Misconceptions that might exist among professionals were identified in two areas: acceptance of the existence of broad variation among individuals with regard to alcohol effects and, relatedly, the failure to equate increased BAC with increased risk.

To counteract the notion that some, and perhaps many, drivers can withstand the debilitating effects of alcohol, it was recommended that judges and prosecutors be provided with materials detailing the effects of alcohol on performance. Description of the impairment present even at low BACs, it was reasoned, would serve to reduce the credibility of arguments that some individuals can drive safely even at BACs well in excess of 0.10%.

To counteract the idea that there is no direct relationship between increased BAC and driving risk, it was recommended that materials aimed at judges and prosecutors include a detailed explanation of the concept of risk, the means by which it is measured, and a statement of current knowledge concerning BAC and crash risk. This recommendation was changed following testing, however, when testing of a draft document showed that attempts to explain the statistical basis of risk to groups of lawyers were disastrous. It was deemed more effective simply to present existing risk information without providing detailed exegesis.

It also was recommended that newly appointed judges and prosecutors--particularly the latter--be a separate focus for educational efforts. It was suggested that materials emphasizing the necessity of DWI training and information resources be provided to those in supervisory positions to ensure that new appointees will receive them. The materials being developed under this contract form one necessary element of such a training package.

Finally, it was noted that prosecutors can play a key role in educating potential jurors. Thus, it was recommended that prosecutors be informed concerning public misconceptions surrounding alcohol and driving so that they could counteract such misconceptions through the use of expert witnesses during trial. During testing, however, this particular segment of the message document was not well received.

2. Conclusions Pertinent to Potential Jurors

It was clear that most focus group participants did not consider driving a particularly difficult task, although they recognized that emergencies can occur. It was recommended that any messages emphasizing the impairing effects of alcohol avoid exaggerating the complexity of the driving task. Given current perceptions, such a message would not be credible. The message that alcohol reduces the ability to cope with threatening situations, which reinforces prevailing beliefs, has a greater chance of acceptance.

While some focus group members had an accurate idea of the number of drinks required to bring an average person to blood alcohol levels associated with DWI, most did not. Underestimates were common. This suggests that juries, unless carefully informed, may believe that a DWI offender has only consumed a moderate amount of alcohol. Correct information, provided during the course of a trial by an expert witness, will be useful.

CHAPTER IV: MESSAGES, TARGET AUDIENCES, AND APPROACHES

A. DEVELOPMENT OF EDUCATIONAL STRATEGY AND TEST MESSAGES

The preparation of educational materials is most effective if it takes place within the context of an educational strategy: a statement of the persons to be changed (e.g., judges, prosecutors, and jurors) and the specific change to be brought about (e.g., increased knowledge). The educational strategy devised for this contract was as follows:

Increase the knowledge of judges, prosecutors, and jurors regarding the impairment to driving performance caused by alcohol, including particularly the following areas:

- o The amount of alcohol required to become legally intoxicated;
- o The relationship between BAC level and driving risk;
- o The amount of alcohol required to generate impairment; and
- o The limits to ability to tolerate or compensate for the effects of alcohol.

A summary of the educational strategy proposed in January, 1986 is shown in Exhibit IV-1. At this point during the contract period, judges and prosecutors constituted the principal target audiences for the educational materials. The need for brief educational materials directed at the general public that could be used by prosecutors and others as part of their own educational initiatives emerged, as was discussed below, during the testing period.

Numerous potential concepts are associated with each knowledge objective. This duplication allowed writers to use various options in developing draft messages. During testing, the concepts of greater interest to the intended target audience were identified. In addition, it was noted that several

EXHIBIT IV-1

SUMMARY OF PROPOSED EDUCATION STRATEGY,
POTENTIAL CONCEPTS, AND SUGGESTED AUDIENCES

STRATEGY

Increase knowledge of the amount of alcohol required for legal intoxication

SUGGESTED AUDIENCES

Judges
Prosecutors
Jurors (through expert witnesses)

POTENTIAL CONCEPTS

Impairment is caused by alcohol.
- Equivalency presentations
- Explanation of "proof," "percent alcohol"
- Misconceptions

BAC can be measured accurately.
- Descriptions of technology
- Accuracy of breath versus blood measures
- Limits to substances causing inaccurate readings

The amount of alcohol required to reach legal intoxication.
- Text
- Consumption tables
- Burn-off tables

STRATEGY

Increase knowledge of the relationship between BAC level and driving risk

SUGGESTED AUDIENCES

Judges
Prosecutors

POTENTIAL CONCEPTS

BAC can be measured accurately.
- Descriptions of technology
- Accuracy of breath versus blood measures
- Limits to substances causing inaccurate readings

The risk that a driving episode will end in a crash increases with BAC level.
- Modified text and graphics as per Alcohol and Traffic Safety 1984

Risk is a relative concept.
- Big and small numbers
- Necessary versus unnecessary risk

DWI laws are based on a conservative risk/benefit premise.
- Stringent laws in other countries
- Skills reduced at 0.05% BAC
- Not harassment legislation

**EXHIBIT IV-1
(Continued)**

**SUMMARY OF PROPOSED EDUCATION STRATEGY,
POTENTIAL CONCEPTS, AND SUGGESTED AUDIENCES**

STRATEGY

Increase knowledge of the amount of alcohol required to generate impairment

SUGGESTED AUDIENCES

Judges
Prosecutors

POTENTIAL CONCEPTS

Documented reduction in abilities begins under 0.05% BAC.
- Discussion of Moskowitz and Robinson review
- Explanation of relationship between abilities and driving

STRATEGY

Increase knowledge of the limits to ability to tolerate or compensate for the effects of alcohol

SUGGESTED AUDIENCES

Judges
Prosecutors
Jurors (through expert witnesses)

POTENTIAL CONCEPTS

Documented reduction in abilities begins under 0.05% BAC.
- Discussion of Moskowitz and Robinson review
- Explanation of relationship between abilities and driving

Concentrated attention is relatively resistant to alcohol. Divided attention suffers quickly.
- Concentrated attention has not been shown to be impaired at anything less than 0.06% BAC
- Ability to handle more than one task degrades rapidly
- Information processing time increases with low levels of alcohol
- Important abilities affected by alcohol, such as vision, are not detectable by the individual and cannot be corrected

concepts, such as the notion that BAC can be measured accurately, are pertinent to more than one educational objective.

Following NHTSA approval of the educational strategy, development of print materials began. The vehicle chosen for communicating with judges and prosecutors was a brief booklet, entitled "Alcohol Impairment and Driving." This booklet was developed by SRA staff using as resources the report on BAC and impairment by Moskowitz and Robinson, the SRA literature review, and existing NHTSA materials. The booklet was extensively reviewed by NHTSA for technical accuracy before being placed before the target audiences.

B. JUDGES AND PROSECUTORS

1. Testing Methodology

A second round of focus groups (Round II) was conducted to obtain audience response to the draft version of "Alcohol Impairment and Driving." Participants were provided with a copy of the document one day in advance of the focus group in order to allow them time to read the booklet. To obtain immediate impressions, respondents were asked to rate each section of the booklet as they finished reading it, assessing the information value and usefulness of that specific section. This procedure allowed for immediate feedback and also motivated the participating judges and prosecutors to read the booklet prior to the discussion group. The booklets were collected after the focus groups so that comments marked on the draft could be incorporated into the analysis.

Judges were again recruited at the National Judicial College at the University of Nevada, Reno. Judges were drawn from a number of different states. Reading of the booklet and attendance at the focus group sessions were made part of the curriculum by NJC instructors, which resulted in excellent attendance and participation. Four focus group sessions were held on two consecutive days, March 4 and 5, 1987 and were attended by a total of 36 judges.

Prosecutors were recruited from the Washington, D.C. area and from Lexington County, and Richland County, South Carolina. Washington area prosecutors were again recruited with the assistance of the State's Attorneys Coordinator for the State of Maryland. The focus group for Washington area prosecutors was conducted at SRA facilities in Alexandria, VA on May 27, 1987. Six area prosecutors participated.

In Lexington County, South Carolina, a focus group was held on May 15, 1987. Five prosecutors participated. SRA staff also met with a mid-level staff member of the Richland County Solicitor's Office who had been delegated the task of reviewing the booklet by the County Solicitor. This meeting was held on May 26, 1987.

South Carolina differs somewhat from other states with regard to DWI laws. South Carolina does not have either per se or presumptive DWI legislation; rather, a BAC of 0.10% creates a "permissible inference" of intoxication. Due to a recent ruling of the South Carolina Supreme Court, the Solicitors may not spell out the fact that the defendant is presumed or inferred to be intoxicated at 0.10% BAC. According to the South Carolina prosecutors, jurors must decide on their own what the BAC level presented in the case means. It is also pertinent to the prosecutors' position that they do not deal with first offense DWI cases. These are handled by a magistrate, with no one from the Solicitor's staff present. The prosecutors' office only handles second or multiple offense and felony DWI cases. Jurors may not be informed that any cases they will hear will be second offense cases, so as not to prejudice their decision.

Within each focus group, the moderator first determined the general reaction to the booklet and then explored responses to individual sections. The rating sheets were tabulated and analyzed after the conclusion of the groups.

2. Results

The results of the focus groups are presented in terms of the general response to the booklet as a whole, a section by section analysis, and the booklet ratings.

a. General Response. The general response to the booklet was much more critical than had been anticipated. This response can be summarized in six categories: perspective, applicability, length/depth, tone and terminology, data validity, and educational usefulness.

- o Perspective. Judges' predominant response to the booklet was that it was biased in its perspective. A number of judges indicated that it was "slanted," "propaganda," and a "political document." Several believed that the thrust of the booklet was not merely the presentation of information, but argument for a change in existing legislation.

The fact that the booklet explicitly described itself as offering "information that may be useful to judges and prosecutors" probably generated a large part of the adverse reactions noted. Judges clearly resented "being lumped with prosecutors." One judge noted that this pairing suggests that the judge and the prosecutor are a team: "you convict them, I'll hang them." Judges emphasized that their role required impartiality. Judges must consider the evidence of experts on both sides.

Prosecutors, like the judges, commented that the perspective of the booklet was biased. Unlike the judges, however, they did not find this to be an objectionable feature of the booklet. This is undoubtedly a reflection of their professional position vis-a-vis the judges' position.

- o Applicability. Comments under this section closely paralleled those under "Perspective." Judges objected to being identified as a target

audience for this booklet. They suggested that "the pitch" should be to the legislature and not to judges. Regardless of their personal beliefs, they noted, they are governed by state laws. One judge specifically questioned how his performance would be improved by the information offered in the booklet, saying the laws that he deals with tell him what his parameters are.

Washington area prosecutors believed that both prosecutors and judges were appropriate audiences for the booklet, along with legislators, judicial committees, defense attorneys, and school systems. One prosecutor suggested that the materials might be more relevant to judges than to prosecutors. Police officers were noted as a particularly important potential audience for the information in the booklet.

South Carolina prosecutors echoed the comments of the judges. Their overall sense of the document was that it was not immediately useful to them. The decisions of the South Carolina Supreme Court were identified as the principal influence on the manner in which DWI cases are handled. Thus, the information was not seen as directly relevant to their tasks. The primary value of the booklet, to these prosecutors, was as a handout they could use in their presentation to civic and school groups.

- o **Length/Depth.** While judges differed in their assessment of different sections of the booklet, there was general agreement that it was too long. Judges emphasized that they must digest material quickly and need brief, cogent information. At the same time, they indicated that they would prefer to be able to explore particularly interesting material in more detail. It was recommended that a bibliography of source material be added. Similar comments were offered by prosecutors.
- o **Tone and Terminology.** Scientific terminology used in the booklet ran into two problems. First, certain key words such as "assumption" were

interpreted in a manner unanticipated by the social scientists who authored the booklet. Whenever the words "assumption" or "it is assumed" appeared in text, the judges perceived that whatever was being discussed was open to debate, a matter of opinion rather than evidence. For example, in explaining how alcohol impairment is tested, the text stated "scientists make a number of assumptions..." Numerous judges noted that the use of assumptions was "unscientific." Second, terms such as "dosed drivers" and "performance decrements" were considered too technical. Prosecutors similarly noted that technical concepts should be expressed in plain English, or "vernacularized."

- o **Data Validity.** A number of judges questioned the scientific validity of the studies referenced in the text. It was stated that for every study presenting one position, an expert witness will produce ten studies for another position. One judge, drawing a parallel to his legal experience, noted that at times he was referred to a decision cited in a case before him only to find that his reading of the case differed from that of the presenting attorney. The judges reiterated that sources would be useful so that they can examine in detail materials that interest them. While prosecutors did not question the validity of the material presented in the booklet, they, like judges, indicated that bibliographic material would be useful.

- o **Educational Usefulness.** With the exception of one or two individuals, judges did not see the booklet as useful to them as an educational tool. Judges emphasized that they must maintain impartiality in their presentations to the community as well as in court, and said that their use of these materials could be construed as reflecting a partisan position with regard to DWI. They noted that a number of other educational materials are already available, such as videotapes for high school use and billboards for general public awareness. One judge, however, suggested that the booklet should be required reading for all high school students and for all of the parole officers working with his court.

b. Section by Section Analysis. Responses to the individual sections of the booklet are summarized below.

- o "Introduction." Much of the judges' adverse response to the booklet may have stemmed from the fact that the document was jointly addressed to judges and prosecutors. This targeting takes place in the introduction. In addition, judges indicated that this section was too long.

- o "Alcohol and the Human Body." Although judges expressed the opinion that this section was too long, they did credit it with presenting new information. The analogy explaining 0.10% BAC as one drop of alcohol to every 1,000 drops of blood was cited as helpful. Most judges were not aware of physiologic differences between the sexes with regard to alcohol. It was not generally known that a higher proportion of a woman's body weight is fat, thus increasing her BAC relative to a man of the same weight. Some judges said that information on the peaking effect should be added to this section.

Prosecutors in the Washington area commented that the terminology in this section was occasionally too technical, and that the chart was confusing. They requested a bibliography. South Carolina Solicitors believed that the section was too academic for their purposes, having no courtroom application.

- o "The Effects of Alcohol on Driver Performance." Judges commented on the length of this section. They also cited the need to identify source material. Several judges noted that impairment was not quantified in the material and wanted information telling them how much impairment a driver was experiencing. Since this section contained considerable technical information, it also came under fire for the use of jargon: "dosed drivers," "performance degrades," "information processing ability," and so on. Use of the word "assumption" in describing scientific experiments also caused problems. The subsection on tracking received several positive written comments from

the judges, as did the subsection on alcohol effects on driver performance. Several judges, in their written notes, wanted the source of the research showing that BACs of 0.04% impaired emergency response.

Prosecutors in the Washington area noted that there have been many driving demonstrations performed in addition to the studies cited; they indicated that reference to these "real world" tests would be desirable. Response of prosecutors in South Carolina was mixed. Their first reaction was that the information presented was only of academic interest and not applicable to courtroom work. As the discussion continued, however, one prosecutor suggested that the booklet be provided to all prosecutors for use in public education work. Expounding on this theme, the prosecutors expressed the opinion that many jury members think of DWI as "drunk driving" rather than "driving under the influence of alcohol," and thus are reluctant to convict anyone who does not appear before them falling down drunk. One prosecutor pointed out that if a person appears reasonably sober on a videotaped sobriety test, jurors do not convict regardless of the BAC level. He believed, and the idea was supported by the rest of the group, that the public needs to be educated to the fact that impairment and drunkenness are two different things, and that one can be impaired without appearing to be drunk.

To the prosecutor from Richland County, who was interviewed separately, the fact that this report was prepared by NHTSA had value. He noted that the report contained "scientific tests" of impairment, and thus would not be dismissed as an unimportant report by the South Carolina Law Enforcement Department.

- o "Breath Alcohol Analysis." The judges were somewhat skeptical of the section on breath testing. More references to support this section were requested. In particular, the NHTSA study of the rate of DWI suspects with acetone in their blood and the assertion that usual

police procedures do not obtain deep lung breath were pointed out as requiring specification of source material.

There was limited discussion of this section among South Carolina prosecutors. The consensus seemed to be that defense lawyers do not attack the accuracy of the devices anymore, although they at one time did; rather, the defense questions the ability of the operator. Washington area prosecutors discussed the many challenges to breath alcohol analysis as evidence and repeated the need for documentation of the material presented.

- o "The Risk Alcohol Adds to Driving." Judges' response to this section in the focus group setting was generally favorable; written comments, however, were more critical. This section began with a brief explanation of the method used to determine crash risk. The explanation may have raised more questions than it answered. Reactions included requests for a fuller explanation of the method, confusion, and rejection of the information presented.

Prosecutors in Washington stated that this section was the "least useful" to them, but that it was geared toward civic groups. Prosecutors in South Carolina responded similarly, noting that information on risk was not admissible in court, where only the facts in the case may be used. The notion that the public should be educated to risk before they serve on juries was raised.

- o "Public Education." This section drew a very adverse response from the judges, who noted that it was too long, repeated information presented earlier in the booklet, and should possibly be condensed and placed in the introduction. Some specific points, such as the notion that regular drinkers learn how to control their behavior but cannot control the abilities they lose, were considered important. However, it was believed that these issues should be covered in other sections of the text.

Washington area prosecutors agreed with judges in their assessment of this section. It was suggested that a list of visual resources be added to the text; another prosecutor suggested providing the name and phone number of a contact person at NHTSA. In South Carolina, discussion of the public education section turned into a discussion of public education itself. One prosecutor had suggested earlier that all prosecutors should receive copies of this report for use in public speaking. The prosecutors reported that they did a good deal of speaking before civic groups. Further, they are particularly interested in educating the public concerning DWI so that when individuals serve as jurors they will have a better understanding of the cases they hear.

c. **Booklet Ratings.** Each participant was asked to review the booklet prior to the focus group meeting and to rate, on a 5-point scale, how "informative" and "useful" each individual section of the pamphlet was. The results of these ratings are provided in Exhibit IV-2.

As would be expected from the different responses noted in the preceding sections, prosecutors rated the booklet as both more informative and more useful than did judges. The booklet was seen as being more informative than useful by both judges and prosecutors.

The sections pertaining to risk and to public education were the worst received sections, receiving low ratings for information value and usefulness from both judges and prosecutors. The sections pertaining to alcohol and the human body and to the effects of alcohol on driver performance enjoyed the best reception among both judges and prosecutors.

3. Conclusions

Several conclusions were reached as a result of the response of the judges and prosecutors to the draft booklet. Most importantly, it was decided that the message would be designed for two separate audiences. One version of the

EXHIBIT IV-2

RATINGS BY JUDGES AND PROSECUTORS
Average Scores (Scale of 1 to 5)

	<u>Judges</u>	<u>Prosecutors</u>
Section 1: "Alcohol and the Human Body"		
Informative:	3.8	4.2
Useful:	3.5	3.4
Section 2: "The Effects of Alcohol on Driver Performance"		
Informative:	3.8	4.1
Useful:	3.3	3.7
Section 3: "Breath Alcohol Analysis"		
Informative:	3.4	4.1
Useful:	3.2	3.8
Section 4: "The Risk Alcohol Adds to Driving"		
Informative:	3.2	3.9
Useful:	2.9	3.8
Section 5: "Public Education"		
Informative:	3.6	3.9
Useful:	3.5	3.9

material, with extensive revisions, would be developed for judges and prosecutors. This would be supplemented by the Moskowitz and Robinson report, which contained the source material they requested. This version, while eliminating much of the technical terminology, would retain a scientific perspective. The revised booklet, "Alcohol and Driving Impairment," is presented in Appendix C. It was extensively reorganized and shortened and all references to judges and prosecutors were removed. The tone was modified and nearly all objections to specific wording were accommodated without loss of substance or intent.

Because judges and prosecutors were nearly unanimous regarding the need for public education materials embodying the information in "Alcohol Impairment and Driving," the educational strategy was expanded to include members of the general public as a target audience. Since this group had originally been anticipated as "potential" jurors it was easily reinstated.

C. POTENTIAL JURORS

1. Testing Methodology

Potential jurors were recruited from the public at large by two professional marketing research firms located in Columbia, South Carolina and Washington, D.C. These firms used specific criteria to select persons who would closely approximate persons who might be selected for jury duty on a drinking and driving related case. These requirements for participants included their being currently registered to vote, being of ages 21 or over, having never been arrested or convicted of driving while intoxicated, and having no close friends or family who had been involved in an incident involving someone's drinking while intoxicated. Participants were also selected to be representative of age and sex percentages of the population at large. The Washington, D.C. focus group included participants from Virginia and Maryland as well as the District of Columbia.

Two pamphlets were presented at each focus group: one with text only and one with text and graphics. The text was a considerably shortened and revised version of the booklet that was presented to judges and prosecutors. Both

versions of the pamphlet were one page fold-outs. The pamphlets were read during the focus group and rated on the spot. Ratings were collected and the pamphlets were then discussed.

The text-only pamphlet was presented first. This was done in order to focus entirely on the narrative presentation of the information. The graphics version was presented second to assess the impact of various illustrations.

2. Results

The sections below present results of the four potential juror focus groups.

a. General Response. The general response to the first pamphlet (text only) was extremely favorable. Participants were very interested in the material and thought it to be sorely needed information. Responses were more mixed with regard to the second pamphlet (text and graphics). Respondents indicated that the number of graphics was excessive and that the detail made the material more instead of less complex. Extensive discussion of this item during the focus groups identified the chart that illustrated the content of various drinks as the one to be eliminated. The graphics illustrating BAC and typical drinks and BAC and skills impairment were considered to be indispensable; the graphic illustrating BAC and crash risk was considered expendable. With regard to format, participants favored a single page, three-fold style over suggested alternatives (oversize fold-up, center staple, and book fold).

All participants believed that the pamphlet, with revisions as discussed below, would be a valuable contribution to educating the public on the impairment effects of alcohol.

Four focus groups, involving 40 potential jurors in all, were conducted. This consisted of two groups, one male and one female, of ten persons each in the Washington, D.C. area and two similar groups in the Columbia, South Carolina area. The South Carolina focus groups were conducted on August 27, 1987; the Washington D.C. groups were conducted on August 31, 1987.

b. Section-by-Section Analysis. Responses to the individual sections of the pamphlet were as follows.

- o Title "Every Drop Counts": The majority of participants liked this title and said that it poignantly described the overall message of the pamphlet. Responses were divided between the two subtitles that were presented, "Alcohol and Driving Impairment" and "Alcohol and Safe Driving" with the majority preferring the former. While the latter title was thought to be less technical, it was also considered internally contradictory.
- o Untitled Introduction. There were few comments about the introduction, as to be expected, and no major objections. Several participants wanted to know whose research we were citing. Several other participants objected to the use of the word "crash" citing that a drunk driver can hit and kill a pedestrian, drive home, and never have had a "crash."
- o "What's in a Drink?" Nearly all participants found this section interesting and informative. However, the majority of participants also found the accompanying graphic too complex. Many participants pointed out that while the information was interesting, it did not provide the reader with an understanding of what a "typical drink" was--information necessary to understand subsequent sections.
- o "What Is BAC?" Participants were interested in this section but thought it required additional material to be complete. Specific information requested were factors that affect an individual's absorption of alcohol and an explanation of how to interpret the accompanying graphic. Several participants objected to the weights given in the example, challenging them as not being representative of the general population.
- o "What BACs are Unsafe?" This section encountered resistance but was acknowledged as being the crux of the pamphlet. Objections were

raised about the technical nature of the section and the scientific terminology. Participants requested examples for clarification. One participant suggested omitting the zero preceding the decimal points as a psychological simplification of the data. Participants also cited the need for consistency in terminology between the text and the chart.

- o "What's the Risk?" There was no objection to this section. There was, however, mixed opinion as to whether the chart was necessary since the information on it was included in the text. Some participants believed it was redundant while others said it was necessary for emphasis.

- o "Don't Cruise on Autopilot!" This section was unanimously rejected. Some participants confused the allusion with the recent airline disasters while others assumed the reference was to the cruise control feature on some cars. In addition, some participants thought the tone was moralistic and hokey--uncharacteristic of the otherwise objective and scientific orientation of the pamphlet.

c. Pamphlet Ratings. The tally of the ratings is provided in Exhibit IV-3. A scale of 1 to 5 was used. Ratings are provided for all four groups for both text-only pamphlet and for the text and graphics pamphlet.

In response to the text only pamphlet, participants indicated that it was about right in terms of complexity, giving it a 3.2 rating on the scale of simple to complex. (Three is the mid-point.)

There was no significant difference between male and female responses. All groups rated the pamphlet as above the mid-point in terms of how informative it was giving it a combined rating of 3.8. Women rated the pamphlet higher in this regard than did men. The highest scores were in "believability" with both men and women rating it highly at 4.3. Both groups also rated the pamphlet as above the mid-point in usefulness, giving it a 3.8.

EXHIBIT IV-3

POTENTIAL JURORS PAMPHLET RATINGS
Average Scores (Scale of 1 to 5)

	SC Female		SC Male		DC Female		DC Male		All	
	Text	Ch.	Text	Ch.	Text	Ch.	Text	Ch.	Text	Ch.
Too Simple/ Too Complicated	3.5	3.4	3.2	3.6	2.9	4.1	3.1	3.9	3.2	3.8
Not Informative/ Very Informative	3.8	4.3	3.6	3.6	4.0	4.3	3.9	3.6	3.8	4.0
Not Believable/ Very Believable	4.4	3.9	4.3	4.2	4.2	3.6	4.1	3.7	4.3	3.9
Not Useful/ Very Useful	3.7	4.1	3.9	3.7	3.7	3.6	3.7	3.4	3.8	3.7
Prefer: With Charts/Without Charts		2.0		3.8		3.5		2.9		3.0
Pamphlet was talking to:										
Someone like you	5		4		4		4		17	
Someone else	3		5		5		4		17	
No. of Charts:										
Too Many	6		3		3		5		17	
About Right	4		6		7		5		22	
Too Few	0		0		0		0		0	

Participants were evenly split on the issue of who the pamphlet was addressing, half believing it was addressing someone like them and half believing it was addressing someone else. Those who indicated the pamphlet was not addressing them, cited the following as persons at whom they thought it was directed:

- Someone who drinks more
- Person with a drinking problem
- Person between 18 and 30
- Someone not as well-informed
- Person who drinks and drives
- High school student
- Alcoholics
- Very educated person
- Casual drinker

In response to the version with graphics, the ratings were less positive. All groups said the pamphlet was more complex, giving it a rating of 3.8. However, most participants also said it was more informative, with more women being of this opinion than men. Oddly, all groups--across the board--indicated the pamphlet was less believable than they had rated it without the graphics. Also, the overall rating for usefulness was also lower than the rating for the text-only version.

Nearly half of the participants believed the pamphlet had too many charts; more than half rated the number as "about right." Many participants stated during discussion that while the number was right, the particular graphics were not.

d. Conclusions. The major findings of this final round of focus groups were the continued persistence of difficulty with technical terminology and with the perceived complexity of the graphics. Additionally, and of greater significance, was the identification of the need for clearer linkage between "typical" drinks and BAC.

Thus, the pamphlet was revised again with the objectives of simplification and tightening. Terminology was further simplified and examples were added. Some new material was developed and some existing material deleted, as suggested, and graphic illustrations were revised and reduced to three in number.

In accordance with participants' stated preference, the revised version was formatted into a single page, three-fold presentation. The revised pamphlet, "Every Drop Counts," is provided in Appendix D.

CHAPTER V: RECOMMENDATIONS

A. EDUCATIONAL STRATEGY

An educational strategy, as noted earlier, specifies the group or groups to be changed, the manner of change desired, and the messages to be employed in pursuit of that goal. Because resources are limited, it also is useful for the educational strategy to set priorities among target audiences for the development and dissemination of materials. The educational strategy originally devised for this contract was as follows:

Increase the knowledge of judges, prosecutors, and jurors regarding the impairment to driving performance caused by alcohol, including particularly the following areas:

- o The amount of alcohol required to become legally intoxicated;
- o The relationship between BAC level and driving risk;
- o The amount of alcohol required to generate impairment; and
- o The limits to ability to tolerate or compensate for the effects of alcohol.

Testing showed the need for establishing priorities in the implementation of this strategy. First, not all potential messages in the strategy could be communicated with equal ease within the limits of a brief, voluntarily-read booklet. It was necessary to single out the information that came across most clearly for emphasis. Second, target groups differ in their ability to affect the handling of DWI cases as well as in the ease with which members can be reached. Direction of effort among groups ensures that NHTSA resources will have maximum impact.

1. Target Groups

It is recommended that target audiences remain those specified at the initiation of the contract period: judges, prosecutors, and potential jurors.

Among these groups, prosecutors should receive highest priority. Prosecutors take an active, rather than reactive, part in DWI case handling. The prosecutor determines whether a specific offender will be prosecuted on alcohol-related charges or allowed to plead guilty to a lesser offense. In other work carried out for NHTSA, SRA determined that conviction rates for DWI cases brought before a judge were very similar (in the 90% range) across several jurisdictions (Contract No. DTNH22-85-C-07255, Assessment of Citizens' Group Court Monitoring Programs). The proportion of DWI charges reduced from the alcohol class before appearing in court, however, varied from virtually none to almost half of all cases. If ensuring consistent post-arrest outcomes is a principal NHTSA goal, modification of prosecutor behavior through education is a step toward this goal.

Judges and jurors play a reactive role in DWI case handling, as they respond to the information presented in court. Ideally, their reactions should be based on an informed assessment of the testimony presented, based on their own knowledge of the impairing effects of alcohol. Prosecutors frequently attribute failure to convict DWI offenders to a lack of understanding of alcohol's effects on the part of jurors. Thus, judges and potential jurors form the second priority audiences for information on alcohol and driving. Of the two, judges have a higher priority than potential jurors, simply because their numbers are more limited and communication channels to these individuals are more direct.

It should be noted again that the objectives and priorities stated in the preceding paragraphs are based on the target audience's roles in the handling of DWI offenders. If the principal objective of the educational campaign were to reduce the number of individuals who chose to drive after drinking, members of the general public, or subsets of the general public, would assume higher priority.

2. Messages

Of the four general messages outlined in the original educational strategy, two assumed a lower priority after testing: the amount of alcohol required to become intoxicated and the limits to tolerance or compensation.

The amount of alcohol required to reach 0.08%, 0.10% or 0.13% BAC, depending on the state, is generally known by judges and prosecutors within that state, presumably communicated by state personnel or manuals. There does not appear to be a significant knowledge gap in this area that NHTSA needs to fill. For members of the general public, the advisability of communicating the amount of alcohol required for legal intoxication, as opposed to the amount of alcohol that causes impairment, is debatable. During the initial round of focus groups it became apparent that most potential jurors underestimate the amount of alcohol needed to exceed the legal limit. This underestimate may cause them to respond inappropriately during those brief periods of time when they serve as jurors and a DWI case is heard. However, it may also prevent them from driving while intoxicated in the far more likely circumstance that they have a few drinks and then must decide whether or not to drive. Thus, it appears more desirable to communicate the impairment associated with alcohol in moderate quantities.

It would appear that efforts to undercut the notion that some individuals tolerate alcohol better than others, or that there are things a driver can do to compensate for the presence of alcohol, cannot proceed directly. The discussion of "common misconceptions" in the first version of "Alcohol Impairment and Its Effects on Driving" was not well received by professionals. Practitioners in per se states simply do not see driving performance over 0.10% BAC as an issue, because the law refers not to performance but to the level of alcohol in the blood.

B. COMMUNICATIONS STRATEGY/DISSEMINATION PLAN

Print is recommended as the principal communications medium. The development of audio-visual materials is not recommended. The principal audiences are small, making the expense involved in the development of quality audio-visual materials inappropriate. Further, the material to be covered, alcohol impairment, is technically complex. It does not lend itself to the necessary brevity of an audio-visual format, nor is it particularly visual. Only driver-performance tests have the sort of sensory impact appropriate for audio-visual presentation, and such tests are not the crux of studies of alcohol impairment. Finally, testing clearly demonstrated that professional audiences wish to have both a brief presentation of materials and an accessible source for further information if desired: print materials can easily be prepared in this format.

Three principal documents have been prepared under this contract:

- o The Moskowitz and Robinson report: "Effects of Low Doses of Alcohol on Driving Related Skills: A Review of the Evidence,"
- o The booklet for judges and prosecutors: "Alcohol Impairment and Driving," and
- o The pamphlet for potential jurors: "Every Drop Counts."

Each is a derivative of the preceding document. It is recommended that differing combinations of these materials be disseminated to the different target audience.

1. Judges

The approach to judges should be modest. As the focus groups demonstrated, a "we know what's good for you" approach will virtually ensure that the materials will meet a hostile reception and will not be read. The tone of communications to judges should emphasize that NHTSA is both showing them its newest products (for their implied approval) and placing a new resource at their disposal.

Because focus groups showed that judges place a high value on being able to confirm the information they receive, it is recommended that judges receive a copy of the Moskowitz and Robinson review in addition to the booklet "Alcohol Impairment and Driving." The fact that the latter document summarizes findings from the longer, more technical report should be noted in cover materials. It is considered unlikely that many judges will read the Moskowitz and Robinson report in its entirety. However, its availability as a resource will address their expressed need for bibliographic confirmation of the findings represented in the pamphlet. In addition, it is suspected that many judges who would consider themselves too burdened to read "Alcohol Impairment and Driving" if it arrived alone will take the time to read it if they perceive it to be a summary of a much longer document, which they also have available.

The pamphlet also should be included as part of the package to judges for two reasons. First, it should be provided as a courtesy, as NHTSA has stated that it is providing them with its most recent materials. Second, if all else fails, the judges may read the pamphlet, which is the most succinct statement of the information. Its inclusion seems to increase the odds that the messages transmitted will be received by the intended audience, even in abbreviated form.

2. Prosecutors

While prosecutors appeared far less sensitive to any suggestion that they require education than did judges, a diplomatic approach probably will yield best results. Again, it is recommended that materials be provided modestly, stating that they represent NHTSA's latest work. In addition, prosecutor interest in public education should specifically be cited in the cover materials, and reference should be made to their possible use of the handout in public education.

The prosecutors' package should consist of a copy of the Moskowitz and Robinson report, a copy of "Alcohol Impairment and Driving," a copy of "Every Drop Counts," and a form for ordering additional copies of "Alcohol Impairment

and Driving" and "Every Drop Counts." As was the case with the preceding recommendation, the inclusion of the Moskowitz and Robinson report in the package stems less from a conviction that the report will be read in its entirety than from a perception of its value as a resource and as a factor motivating prosecutors to read the shorter materials. Inclusion of a form for ordering additional copies of the shorter materials is desirable in light of the prosecutors' expressed interest in public education.

3. Potential Jurors

Distribution of materials to the potential juror/general public audience will necessarily take place through gatekeepers--individuals or organizations with an interest in informing the public concerning DWI. Prosecutors, in addition to being an audience for alcohol information themselves, are also gatekeepers with regard to the civic groups that they address. Other recommended gatekeepers include:

- o Police Academies and Associations
- o Mothers Against Drunk Driving (MADD)
- o Remove Intoxicated Drivers (RID)
- o Public School Systems
- o National Association of Driver's Education Teachers
- o American Association of Family Physicians
- o Department of Motor Vehicles (pamphlets could be provided with first driver's license and with each renewal)
- o State Highway Departments (toll booths, rest stops, truck stops)

Each gatekeeper association selected by NHTSA should be sent a copy of the "Alcohol and Driving Impairment" booklet, the "Every Drop Counts" pamphlet, and a form for ordering additional copies. While it is intended that only the pamphlet be distributed on a widespread basis, the more detailed booklet should be included as a courtesy and as a broader reference for the gatekeeper. The cover letter to these organizations can be a simple one, describing the materials available and expressing NHTSA's interest in sharing them. A summary of the materials to be disseminated is provided in Exhibit V-1.

EXHIBIT V-1

MATERIALS DISSEMINATION

Materials	Target Audiences		
	<u>Judges</u>	<u>Prosecutors</u>	<u>Potential Jurors</u>
Cover Letter	X	X	X
Moskowitz/Robinson Report	X	X	
"Alcohol and Driving Impairment"	X	X	X
"Every Drop Counts"	X	X	X
Order Forms		X	X

4. General Strategy

In addition to sending materials to the specific target audiences, it is further recommended that NHTSA publicize the availability of the pamphlet. This can be effectively accomplished by placing articles or notices in the many trade journals and official publications of groups that represent or appeal to the target audiences.

And finally, it is recommended that NHTSA designate an individual to coordinate publicity and respond to information requests whether it be a contractor, NTIS, or the Consumer Information Office in Colorado Springs.

APPENDIX A

**Abstract and Executive Summary of
"Effects of Low Doses of Alcohol
on Driving-Related Skills: A
Review of the Evidence"**

The report "Effects of Low Doses of Alcohol on Driving-Related Skills: A Review of the Evidence" was presented to the National Highway Traffic Safety Administration in March 1987. A copy of the complete document can be obtained through the National Technical Information Service, Springfield, Virginia 22161.

Presented in this Appendix are an Abstract of the report and the Executive Summary.

ABSTRACT

A large scale review has been conducted of the experimental literature on alcohol effects on skills related to driving. This review considered 178 citations drawn from this literature, and explored the evidence of alcohol effects on reaction time, tracking, concentrated attention, divided attention performance, information processing capabilities, visual function, perception, psychomotor performance, and also on driver performance measures. Impairment in all areas was significant by BACs of 0.05% and first appeared in many areas by 0.02% to 0.03%. Thus scientific evidence suggests no lower limit can be placed on alcohol impairment of driving-related skills.

EXECUTIVE SUMMARY

This report reviews the experimental literature on the effects of alcohol on driving-related behavior, with particular attention given to the BAC level at which impairment first appears. The information provided here is intended to contribute to decisions on appropriate BAC limits for drivers.

The study began with a series of computer searches of the literature on skills performance effects on alcohol. Five hundred and fifty seven citations were found, of which 339 publications were obtained. Of this number, 178 were used in this report, with most of the remaining studies not included for one of the following reasons: the behavioral area was not considered relevant to driving, insufficient methodological detail was provided, or the publications was not available in English. For the 178 selected studies, the authors have calculated BACs at the time behavioral tests were administered, based on the reported dosages. Using details of gender and body weight of subjects, an estimated volume of distribution for alcohol was determined assuming the mean water body weight as 49% for females and 58% for males. Then, using a 15 mg. per cent per hour metabolism rate, the BAC was computed for the time of starting behavioral testing. Since the metabolism estimate is conservative and the mean BAC estimate for the duration of testing would be lower, the estimated BAC at which impairment is reported here is also conservative, erring on the high side.

Of the 178 studies for which computations were performed, 159 reported impairment of one or more behavioral skills at one or more BAC levels. Only 19 studies found no impairment at the levels studied. In 37 studies impairment was found at BACs of 0.04% or less. The majority of studies found impairment below 0.07%. Since the majority of studies examined only one BAC level, these results must represent an underestimation of the BAC level at which impairment begins, principally because these studies failed to examine any level below that at which they initially tested and found impairment. It seems that the determination of what BAC levels are studied is frequently made with reference to the prevailing legal BAC limit. Without drug-dose level studies, it is difficult to determine the BAC level at which impairment might initially occur.

Most of the studies considered here were published during the last decade. The BAC levels studied by these studies appear lower than those typically found in the literature from the 1940s and 1950s and, as a result, impairment is reported at significantly lower than in the literature of previous decades.

The studies considered here were segregated into nine behavioral categories to determine if the BAC at which impairment began was a function of the type of skills involved. The categories were: reaction time, tracking, vigilance or concentrated attention, divided attention, information processing, visual functions, perception, psychomotor skills, and driving on the road or in a simulator.

Despite some problems in assigning experimental tasks to these behavioral categories, considerable differences exist in the BAC at which impairment

first appears. The area of behavior showing the largest initial rise in demonstrated impairment was divided attention performance, with the second fastest rise in impairment found with tracking performance. Studies of vigilance showed the lowest number of findings of early impairment. Effects found for each behavioral category can be summarized as follows:

1. **REACTION TIME.** Impairment was found at lower BACs for complex reaction time, as compared with studies of simple reaction time. Typically impairment appeared at higher BACs than in other areas.
2. **TRACKING.** A majority of studies reported impairment at or below BACs of 0.05%. Differences between types of tracking tasks appeared less important than the context in which tracking performance was studied, with some studies using multi-task situations.
3. **CONCENTRATION ATTENTION.** Concentrated attention appeared to be the least sensitive area to alcohol impairment, with no study finding impairment below 0.05%.
4. **DIVIDED ATTENTION.** Most studies of divided attention found impairment at quite low BACs. Impairment began at less than 0.02%, and a majority of studies found impairment at or below 0.05%.
5. **INFORMATION PROCESSING.** Information processing skills appear to be impaired at relatively low BACs with most studied reporting impairment at or below 0.08%.
6. **VISUAL FUNCTIONS.** Studies of oculomotor control tended to show impairment at low BACs, while other visual functions such as glare recovery, visual acuity, and flicker fusion, did not appear to be impaired at low or moderate BACs when studied by themselves.
7. **PERCEPTION.** Studies in this area showed relatively few findings of impairment below 0.08% BAC.
8. **PSYCHOMOTOR SKILLS.** Tasks which required skilled motor performance and coordination were more likely to be impaired at lower BACs, while studies of other psychomotor tasks tended not to show impairment below 0.07% BAC.
9. **DRIVING.** A considerable variation in results was found, depending on the behavioral demands imposed by the various driving tasks.

It was concluded that there is evidence that behavioral areas relevant to driving differ in their susceptibility to impairment, with divided attention tasks most likely to be impaired at low BACs. It seems that there is no lower threshold level below which impairment does not exist for alcohol.

APPENDIX B

**"Review of the Literature on
Drinking and Driving Behavior, Knowledge
About Alcohol, and Attitudes
Toward Driving While Intoxicated"**

APPENDIX B

REVIEW OF THE LITERATURE ON DRINKING AND DRIVING BEHAVIOR, KNOWLEDGE ABOUT ALCOHOL, AND ATTITUDES TOWARD DRIVING WHILE INTOXICATED

CHARACTERISTICS OF THE DRINKING DRIVER

The characteristics of the drinking driver are important from two perspectives. First, to the extent that the drinking driver is himself a target for educational materials, good design requires an understanding of who this individual is. Second, the response of members of the judicial system--judges, prosecutors, and jurors--to the driving while intoxicated (DWI) offender will be affected by the type of individual who typically commits the offense. The drinking driver may be categorized along four dimensions: demographic characteristics, driving factors, drinking practices, and personality and stress factors. Findings in each of these are summarized below.

Demographic Characteristics

The most consistent findings concerning demographic characteristics of drinking drivers relate to sex and age. First, women are less likely than men to drink and drive at legally intoxicated levels. Two studies found fairly low percentages of males at low BACs but much higher percentages of males at BACs of 0.08% or above (Borkenstein et al. 1964; Wolfe 1975). Research shows a predominance of males among both drinking and nondrinking crash-involved drivers (Walker et al. 1970; Filkins et al. 1970; Borkenstein et al. 1964).

Second, while young drivers are underrepresented in the DWI population, young men between the ages of 21 and 25 are heavily represented both in the offender population and in the crash population. Drivers under 20 are less likely than those over 20 to drink and drive at legally intoxicated levels. For example, Waller et al. (1970) found that while 49 percent of fatally injured drivers under age 20 had been drinking, 61 percent of those over 20 had been. The same study found 16 percent of fatally injured drivers under 20 were legally intoxicated compared to 50 percent of those over 20 who were killed. Similar conclusions were drawn in a number of other studies (Borkenstein et al. 1964; Kasper and Mozersky 1968; Farris, Malone, and Lilliefors 1976; Filkins et al. 1970; Perrine, Waller, and Harris 1971). In the under-20 age group, the relative unimportance of alcohol as a crash factor stems from three factors: (1) low alcohol use--there is a steady increase in the quantity and frequency of alcohol intake from ages 16 through 25; (2) the high mileage rates associated with young drivers, which expose them to higher overall risk of accident; and (3) the fact that drivers in this age range are less skilled than older drivers, and thus have more accidents of all types. Thus, young people are at significant hazard despite the low prevalence of legal intoxication.

Some patterns appear for other biographical variables, such as marital status, occupational level, race, and education, but it is difficult to determine the

effects of each. Studies of links between annual income, religion, and place of residence and drinking-driving behavior have yielded inconclusive results (Borkenstein et al. 1964; Filkins et al. 1970; Waller et al. 1970; Perrine, Weller, and Harris 1971; Wolfe 1975; Calahan, Cisin, and Crossley 1969).

Driving Factors

Most drinking and driving occurs during evening and late night hours and on weekends (Zulman 1973; U.S. Department of Transportation 1968). These patterns also apply to fatal and less serious crashes; similar results are suggested among pedestrian fatalities (Farris, Malone, and Lilliefors 1976).

More drinking and driving seems to occur among people coming from bars, taverns, and friends' homes than among those coming from home, work, or sports facilities (Wolfe 1975; Carlson 1972). These results make intuitive sense, as more drinking probably takes place at the former locations.

Studies of other driving variables either found conflicting results (studies on previous crashes by Filkins et al. 1973; Perrine, Waller, and Harris, 1971; and Waller et al. 1970) or suggested trends but not causality (studies on enforcement actions by Filkins et al. 1970 and Sterling-Smity 1976).

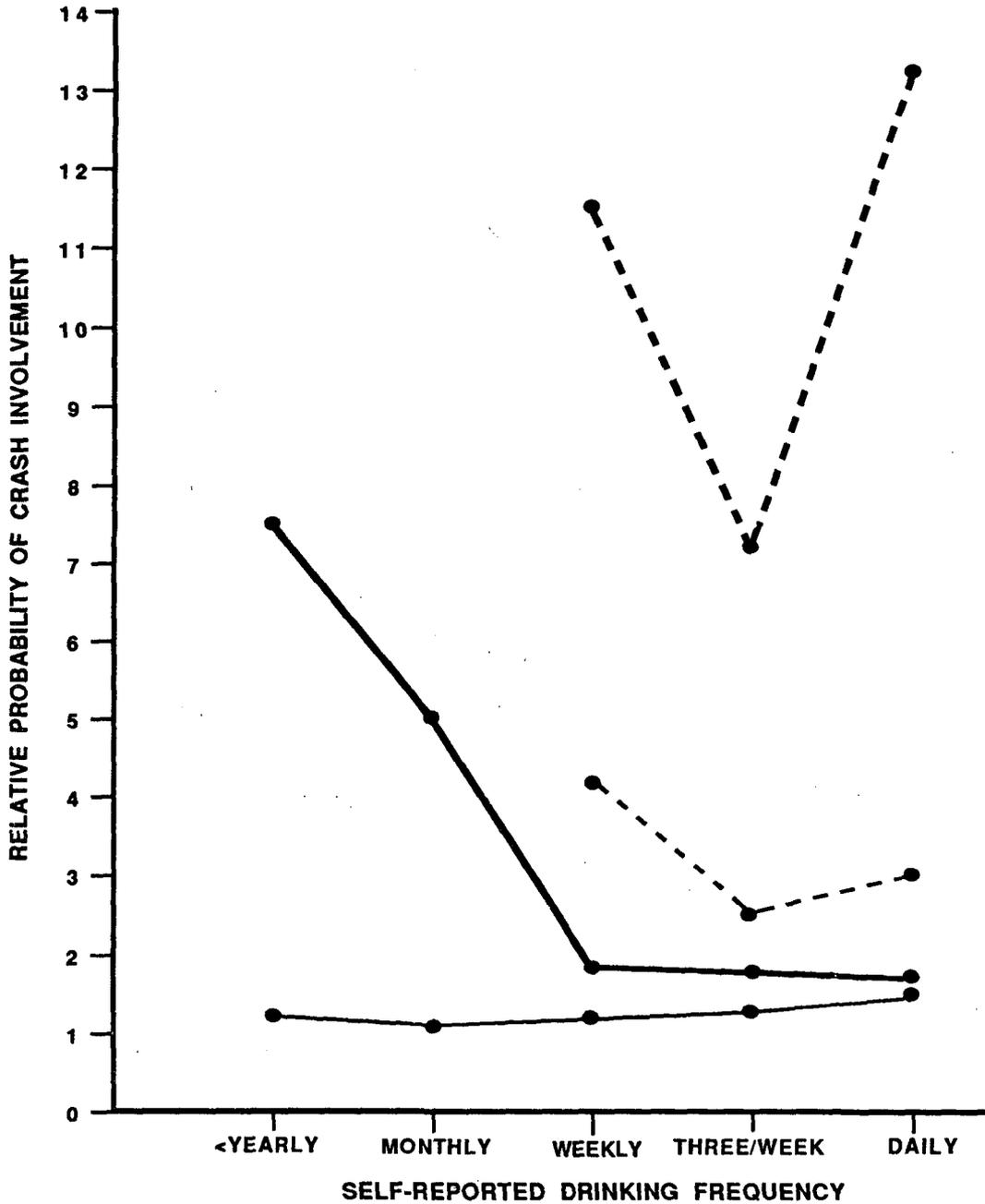
Drinking Factors

Beer is the preferred beverage of crash-involved and noncrashed drivers (Borkenstein et al. 1964). This is to be expected, as per capita consumption of beer is higher than that of wine or spirits (Keller and Burioli 1976).

Two major patterns with regard to BAC and crash involvement emerge. First, it appears that the lower the person's BAC, the lower the risk of crash, regardless of the prior drinking experience of the driver. At the same time, less frequent drinkers seem to be at greater risk of crash at all BACs than more frequent drinkers (Borkenstein et al. 1964; Hurst 1974). Figures 1 and 2 illustrate these findings. These findings point to two conclusions. First, driving while drinking is a learned skill, as demonstrated by the higher crash rates of infrequent drinkers. The concept of learning to deal with alcohol's effects has consequences for public perception of drinking and driving which will be explored in a subsequent section. Second, learning cannot overcome the adverse effects of alcohol on performance. Risk rises with BAC level, providing epidemiologic evidence that the systemic changes induced by alcohol cannot be fully compensated for even by a skilled drinker.

It is clear that problem drinkers are more likely to be arrested for a second DWI offense than are other individuals. One evaluation using the Mortimer-Filkins test, for example, found that 36 percent of problem drinkers were rearrested for DWI, versus 22 percent of the "social" drinkers (Wending and Kolody). The bulk of research into alcoholics and problem drinking has been geared to defining these groups and determining biographical characteristics that may be used to identify them. There is little research determining what

FIGURE 1
RELATIVE PROBABILITY OF CRASH INVOLVEMENT
AT GIVEN BAC LEVELS FOR DRIVERS,
BY SELF-REPORTED DRINKING FREQUENCY

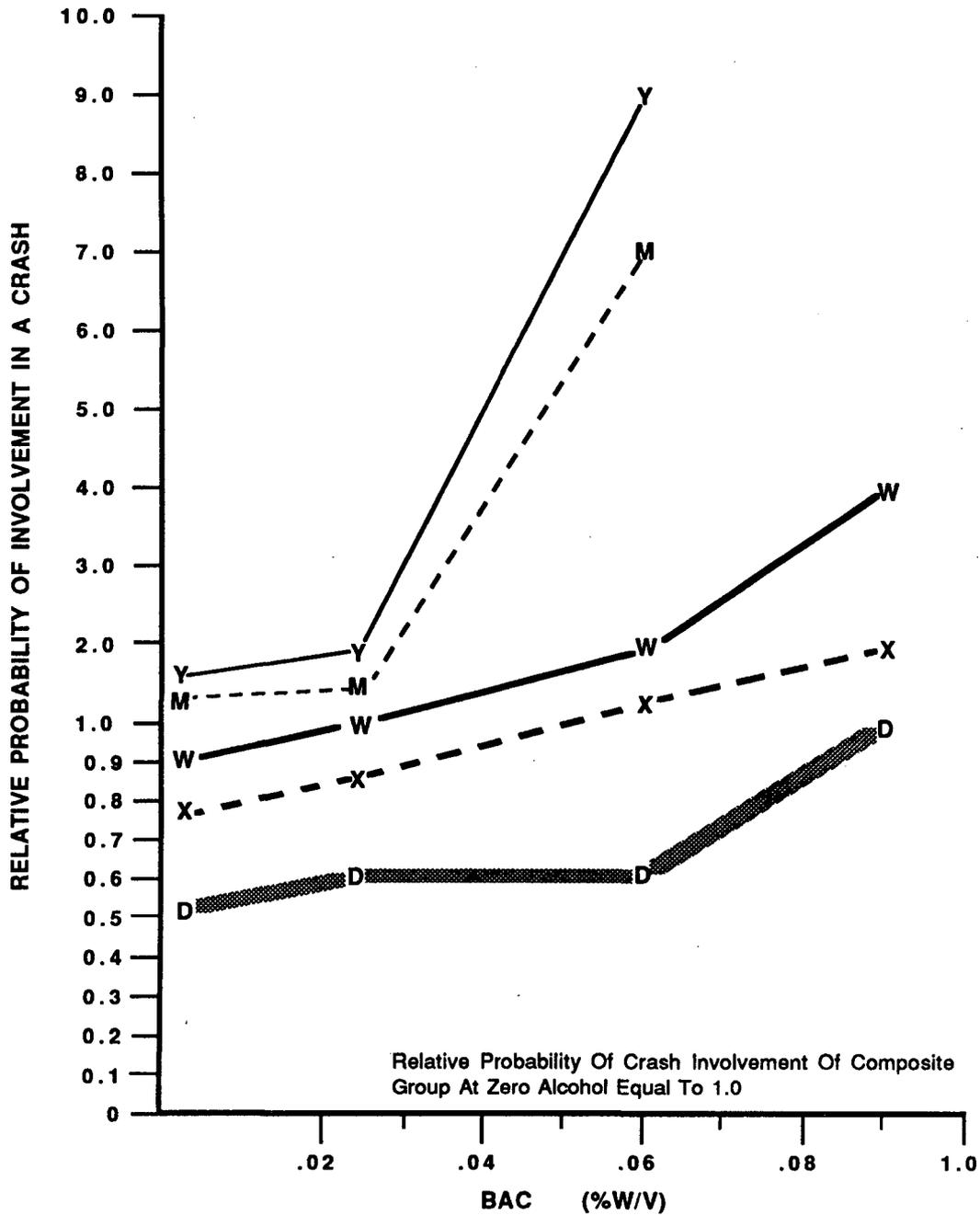


LEGEND: ——— BAC = .01% - .04% ——— BAC = .08% - .10%
 - - - - BAC = .05% - .07% ······ BAC = >.10% W/V

NOTE: Relative probability of involvement equals 1.0 at BAC of zero.

SOURCE: Data from Grand Rapids Study (Borkenstein et. al. 19864)

FIGURE 2
RELATIVE PROBABILITY OF CRASH INVOLVEMENT
BY DRINKING FREQUENCY SUBGROUPS,
AS A FUNCTION OF BAC



Self-Reported Drinking Frequency:

Y ————— Y = YEARLY OR LESS

M - - - - - M = MONTHLY

W ————— W = 3 TIMES/WEEK

X - - - - - X = WEEKLY

D ■■■■■ D = DAILY

SOURCE: Hurst (1974)

proportion of alcoholic and problem drinkers drive while intoxicated, or what proportion of drinking drivers are problem drinkers or alcoholics (Filkens et al. 1973; Kerlan et al. 1971; McBride and Stroad 1975a; McBride and Stroad 1975b).

Personality Variables

Since not all drinking drivers are involved in crashes, many researchers believe alcohol consumption alone cannot explain crash involvement.

Psychological and stress variables are posed as an important causal factor in crash involvement. Because these variables are difficult to define and measure, research in this area often lacks reliability and predictive validity. No conclusions were reached in this area pertinent to the materials to be designed under the contract.

KNOWLEDGE AND ATTITUDES SURROUNDING DWI

Attitudes Toward Alcohol

In general, women and older individuals are less tolerant of alcohol use generally and of DWI specifically than are men or younger individuals (Mulford and Fitzgerald 1983; Davis 1982; Scheurich 1982; Cahalan et al. 1969). As would be expected, individuals who consume alcohol are more tolerant of its use than are those who do not. Similarly, consumers are less severe toward DWI offenses than those who do not drink. Vayda and Crespi (1981) found that individuals who report driving after two or three drinks were less likely to support a variety of alcohol-related countermeasures than were those who did not drive after drinking.

Drinking per se does not appear to elicit widespread disapproval. The problem with drinking is seen to lie in its potential consequences for the individual and those around him. Two recent studies illustrate this point.

Mulford and Fitzgerald (1983) found neutral reactions to "drinking" in Iowa, a conservative state. However, when any consequences of drinking were mentioned, disapproval was expressed. Thus, while attitudes were nearly neutral on the question of men drinking (2.09 on a scale where "3" indicates approval of "1" disapproval), they were less tolerant of "getting high" (value of 1.54) and almost completely intolerant of becoming "intoxicated" (value of 1.09).

O'Brien et al. studied Massachusetts College student responses to various types of drinking as characterized by brief, randomized "vignettes." O'Brien and his coworkers found that in addition to the amount and frequency of alcohol consumption and the age of the person drinking, the presence of consequences from alcohol consumption increased the negative value assigned to drinking. Among the consequences eliciting negative assessment were some the investigators assumed would be considered virtues of alcohol, such as "appears much happier after drinking" or "worries less about school after drinking"

(O'Brien et al. 1982). The two consequences of drinking that drew the most negative assessments from the students were "stopped twice by police for drunken driving" and "drinks and drives." Note that the importance of consequences extends specifically into attitudes toward DWI. Cases resulting in injury or death are considered more serious than those in which no accident occurs.

One might expect the analysis of attitudes toward DWI to be somewhat simpler than analysis of attitudes toward alcohol use in general. The behavior in question is more clearly defined and agreement that it is morally objectionable is widespread. However, the same behavior that is widely deplored is widely admitted to: most drinking individuals at least occasionally drive after a few drinks and a substantial minority drive when they believe themselves to be impaired. In this section we address this contradiction to see what may be learned to help guide contract research into knowledge of alcohol impairment.

Knowledge of DWI as a Problem

Repeated public information and education programs concerning the scope of the DWI problem have resulted in a fair degree of public knowledge about it. Two recent surveys illustrate this point. A personal survey conducted in Missouri in 1978 (n = 10,000) asked respondents to estimate the "percentage of highway fatalities...related to alcohol and other drugs." Alternate answers were 10%, 25%, 50% and "other." The majority of respondents (54 percent) chose 50%, the most nearly correct answer. Similarly, a mail survey carried out in North Carolina in 1978 (n = 988) asked "out of every 10 deaths...how many would you say are caused by drunk drivers?" The largest proportion of respondents (45 percent) selected the correct option, three to five out of ten deaths. (Both cited in Korenbaum 1982.)

Efforts to communicate the results of DWI behavior would appear to have been successful. Message recall in general is high. A 1979 national survey found that over 70 percent of all respondents recalled hearing a message about DWI (Teknetron 1979). In 1981, almost 60 percent of the respondents to a California survey could recall having heard some message concerning DWI within the "past few months" (Davis 1982).

Seriousness of DWI

Given that people have a fair idea of the results of DWI, do they consider such results to be a serious problem? A tentative answer would be yes, they do, when the problem is brought to mind.

A 1981 California study on DWI began by asking respondents to name serious social problems. Not surprisingly, crime and the high cost of living were the problems most frequently volunteered as a cause of concern. Drunk driving was suggested as a problem only 3.6 percent of the time, compared to 30.3 percent

for crime. (Alcohol abuse, however, was the fifth most commonly cited problem.) When respondents were specifically asked their opinion of the seriousness of eight problems, however, two-thirds of them characterized drunk driving as an "extremely serious" problem in their state (Davis 1982).

A 1982 study conducted in Kansas found that 67 percent of the Kansas respondents characterized DWI as an "extremely serious" problem. Asked their response to DWI as a crime, 60 percent described it as an "extremely serious" crime. In both states, men viewed DWI less seriously than did women, and young respondents less seriously than other respondents (Scheurich 1982). In a 1987 poll conducted for The Atlanta Journal and Constitution, 84 percent of voters polled in 12 southern states reported that they were "very concerned" about drunk driving (The Big Issue).

A 1979 national survey carried out for NHTSA found that "avoiding drunk driving" was rated more important for safety than retaining the 55 mph speed limit, safety belts, or air bags (Teknetron 1979).

The perception of DWI as a serious problem and a serious crime carried over, in both California and Kansas, into a desire for strict punishment. The California survey found that people generally believed penalties for DWI to be stricter than they in fact are. Nonetheless, the California respondents expressed support for even stronger penalties. Similar sentiments were found in Kansas, where support was expressed for strong sanctions against DWI offenders. Differences in response to penalties by sex and age paralleled those concerning the seriousness of DWI. The Teknetron study did not address penalties, but found that over 60 percent of the respondents would support higher taxes to support "community programs" to combat DWI.

The seriousness with which a specific instance of DWI is viewed varies with the consequences of the action. A 1983 national survey carried out by Yankelovich, Skelly, and White for the All Industry Research Advisory Council, an insurance industry group, found that relatively moderate penalties were supported for driving under the influence of alcohol given a first offense and no injuries. The most common suggested penalty was "a fine" (43 percent), followed by license restrictions that permit only driving to and from work (36 percent). If that same offense resulted in injury, however, 40 percent of the respondents favored a jail sentence, followed by 27 percent favoring a total license suspension (AIRAC 1983).

THE DECISION TO DRIVE AFTER DRINKING

Self-Reported DWI Behavior

Overall, a good estimate appears to be that one to three percent of all daytime drivers, and five to six percent of those at night, are legally intoxicated (Jones and Joscelyn 1978). The implications of this value differ with the source of those drunk drivers. If the same few drivers are repeatedly drunk, the social problem becomes identifying and deterring those individuals. If this prevalence is the cumulative result of the occasional indiscretions of a large minority of drivers, a much more substantial effort is called for.

The evidence suggests that both sources contribute to the DWI problem. While individuals with alcohol problems do drink and drive, it is also the case that a great number of DWI offenders (not necessarily of those apprehended or convicted) are "ordinary" citizens.

Driving after some drinking is common. A conservative estimate would be that one third of all drivers have, at some time, driven when they believed themselves to be impaired by alcohol. Vayda and Crespi, in their 1979 national survey, asked respondents whether they drank alcoholic beverages and, if they did drink, if they ever drove after having "something alcoholic to drink." Seventy-three percent reported that they drank alcoholic beverages, and two third of those who reported drinking (67 percent) also reported that they had driven after drinking (Vayda and Crespi 1981). These persons constituted 45 percent of the total sample. An Iowa survey conducted in 1978 (n = 768) asked whether it was considered "socially acceptable to drive after several drinks, such as four or more." While the majority of respondents (59 percent) answered "no," a substantial minority (35 percent) answered "yes" (Korenbaum 1982).

Driving after "some" or "several" drinks does not necessarily constitute driving while under the influence of alcohol. However, a sizeable minority of persons will admit to driving when they believe themselves to be impaired. The 1982 California survey cited previously asked respondents whether they had, within the past year, driven when they believed they had had too much to drink. Nearly a third of the men (30.7 percent) and 13 percent of the women replied that they had. This finding is not atypical. A study of college students, a particularly high risk group, found that 51 percent reported driving after drinking, with 30 percent admitting to driving after "excessive drinking." (Engs, cited in Beck)

Driving while intoxicated is considered a serious problem by a majority of the population, but a substantial minority engage in it. To explain this apparent contradiction, one must remember that although disapproval of drunk driving is widespread, the seriousness with which it is regarded is not uniform. Persons who report drinking and driving (Vayda and Crespi 1981) or who belong to groups likely to drink and drive (Davis 1982, Scheurich 1982) generally consider DWI to be a less serious offense and give less support to vigorous penalties than do others.

Understanding of Alcohol Impairment

Individuals are sensitive to impairment when they decide whether they should drink and drive. One study asked students the circumstances under which they would drive after drinking (Thurman, 1986). Thurman found that level of alcohol impairment was the first factor students would use in making their decision, with distance to be driven, weather conditions, time of day, and the existence of alternatives to driving also being considered. Less important factors included the number of police roadblocks, familiarity with the roads, reporting of DWI offenses, and the number of passengers needing the ride. It can be seen that most of the more salient conditions directly pertain to the driving task and, by implication, the driver's ability to carry it out.

However, there seems to be a crucial difference in the public mind between "drunk" driving and "impaired" driving. Briefly, it appears that "drunk" driving is a problem, but driving while impaired is an occasional necessity. A number of misapprehensions concerning alcohol impairment are still widely believed.

Misunderstanding of Impairment and Risk

Drinking is a common American pastime and driving a near universal ability. Inevitably the two sometimes overlap, despite knowledge that this overlap may be dangerous. Drivers may underestimate their impairment, the risks associated with impairment, or both.

Grilly, in surveys of Ohio college students, found near universal agreement that alcohol impairs driving in others (emphasis added), compared to varying levels of assessment of personal impairment (Grilly 1981). Miller et al. (1981) surveyed students leaving a college pub. They reported the following:

although most of the participants who had BACs of 0.05% or greater judged that they were less capable of driving a car safely than when they had had nothing to drink, only 18% judged that they would be incapable of driving safely. Men . . . were much less likely than women to rate themselves as incapable of driving safely.

Meier, Brigham, and Handel (1984) reported similar findings. Of 24 legally intoxicated individuals stopped outside a pub and appraised of their BAC level (0.08% or greater, above the limit in Idaho), 20 nonetheless chose to drive.

Mills and Bosgrove (1983) conducted studies of impairment and perception of impairment at different levels of alcohol consumption. They studied these issues both in a laboratory setting and in a social setting. In a laboratory setting, respondents were able to predict accurately the decrease in their performance at the experimental tasks after consumption of alcohol. Although predictions made in a social setting were considerably less accurate, the authors suggest that

. . . those who were intoxicated held accurate perceptions about their levels of impairment. Statements to the drinker that he is too high (and thus too impaired) to drive may not give the individual new information about his ability to perform. The individual may know very well that he is impaired, but he may also believe that he can take actions to compensate for the impairment.

Drunk Versus Impaired Driving

Some light on popular distinctions between a "drunk" driver and an "impaired" driver is offered by differences in wording in two questions posed by a 1977 Nevada survey. When asked, "which method do you feel would be most effective in dealing with persons convicted of driving under the influence of alcohol," 52 percent of the respondents called for stiffer penalties, followed by 32.4 percent calling for alcohol education. (Emphasis added.) Treatment as an

option did not receive support. The same study also asked "which do you think would benefit a convicted drunken driver more. . ." In this case, traditional penalties were supported by only 32 percent of the respondents, versus 56 percent who favored alcohol treatment programs.

These questions do have slightly different aims: one queries effectiveness, presumably for society, while the other explicitly refers to the driver. However, there appears to be a public perception that there is a specific type of person who is a "drink driver." The popular conception of a "drunk driver" is a person having severe problems with alcohol, whose consumption is frequent, excessive, and uncontrollable. In a South Dakota study conducted in 1979 (n = 525), for example, 40 percent of the respondents agreed that "Most people who are involved in alcohol related auto accidents have a history of problem drinking" (Korenbaum 1982). News stories that focus on "drunk drivers" who have high levels of consumption and frequent convictions emphasize this image. As a result, members of the public tend to classify their own drinking, and their probable driving performance after drinking, as something other than "drunk driving."

Misconceptions About Compensation

There is a common misperception that people can learn to "hold their liquor" well enough to drive safely. An Arizona study conducted in 1979 asked respondents whether a person who "has had a 'few' drinks" could drive better, worse, or about the same. A majority of the respondents, 76 percent, felt that driving ability would be "worse" after a few drinks (Korenbaum 1982). The study also asked "what determines how much a person can drink?" Answers were volunteered by respondents, not provided by the study. The most common response was "experience" (33 percent of respondents), followed by size (25 percent) and "amount of food in stomach" (9 percent). Extrapolating to driving behavior, the "experience" answer suggests a belief that drivers can learn to compensate for the effects of alcohol.

The Mills and Bosgrove study, together with another by Young and Pihl (1980), may illuminate the mechanism by which people decide that impairment can be overcome sufficiently to allow safe driving. Mills and Bosgrove found that heavy drinkers were less impaired at low levels of alcohol consumption than were light drinkers. It would appear that they had learned to compensate for small amounts of alcohol. At high levels of consumption (0.08% BAC), however, this advantage vanished: heavy drinkers performed as poorly as light drinkers at the experimental tasks. The authors suggest that heavy drinkers form estimates of their own ability based on their performance when they have had little to drink. Drinkers then incorrectly extrapolate from this condition to their performance after heavy drinking.

Young and Pihl studied the degree to which drinkers, when motivated, could control the effects of intoxication. During the testing, the subjects' BACs averaged 0.094%. Motivated individuals were able to control the effects of alcohol on their emotional reactions ("overall expressions of amusement" during a task that involved writing captions for cartoons) and on word recall. They were not able to compensate for the effects of alcohol on reaction time

or eye-hand coordination. Emotional reactions, unlike eye-hand coordination, are readily apparent both to the driver and to his or her companions. It is quite possible that success in controlling emotional behavior is frequently assumed to be reflected in all activities, thus giving the average driver the incorrect notion that he or she can compensate for neuromuscular impairment.

Characterization of the drunk driver as a stereotypical "problem drinker," coupled with the belief that alcohol impairment can be overcome, provides the ordinary driver with the rationale needed to separate driving while impaired from drunk driving. NHTSA will have to reduce this misapprehension in order to convince judges, prosecutors, and jurors of the seriousness of driving while impaired, even when carried out by people who are not obvious drunks. A prime task for the initial focus groups will be exploration of current notions concerning the differences between "drunk" and "impaired" and common strategies believed effective in counteracting impairment.

THEORETICAL CONSIDERATIONS

Rationale

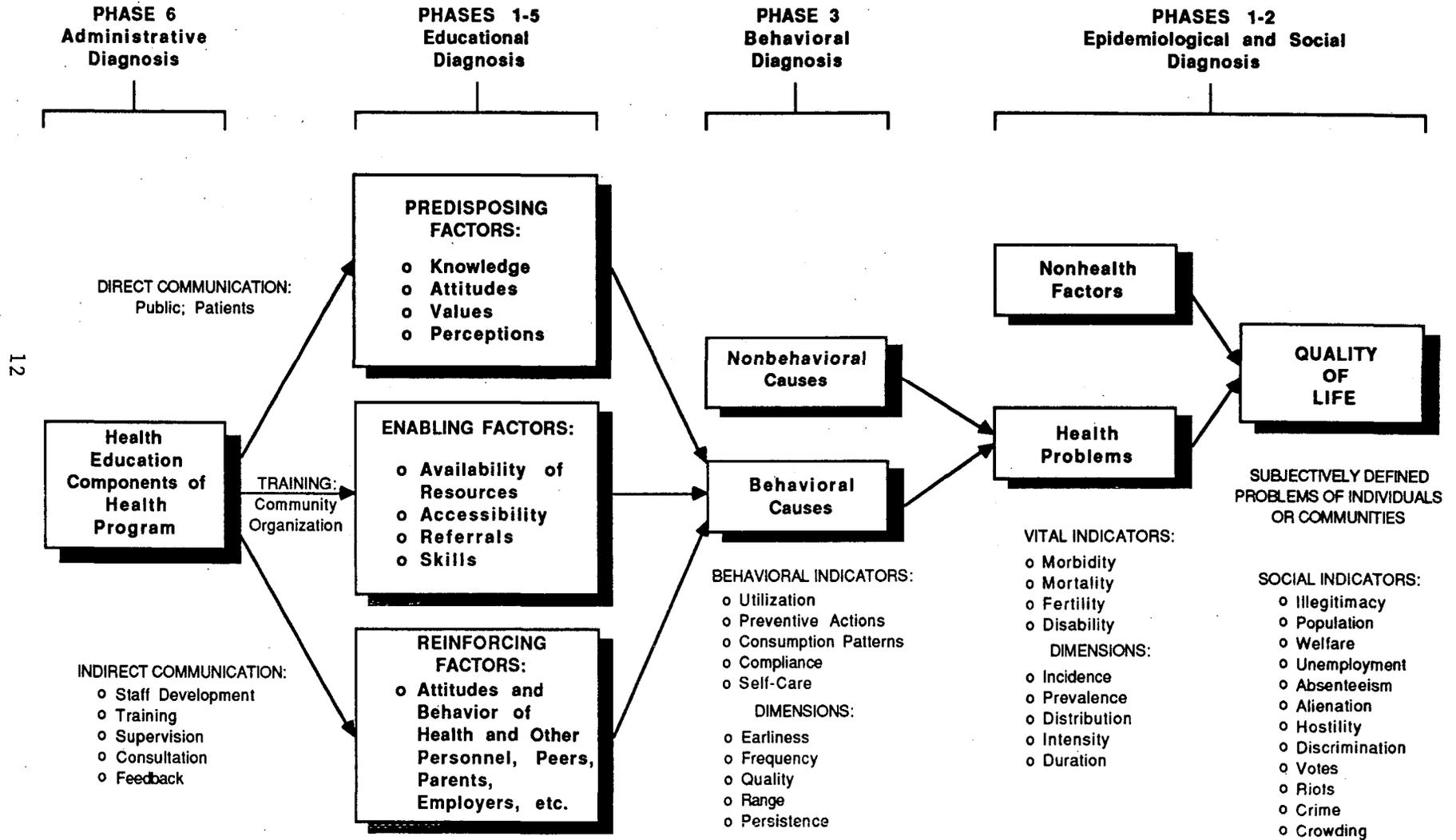
Our review of the literature pertaining to driving while intoxicated has been brief and narrowly focussed. It is likely, therefore, that we have failed to do justice to the richness of research that has been done in the field. Nonetheless, it appears to us that studies of DWI and of DWI countermeasures have not taken advantage of theoretical models that could serve to unite disparate observations into a coherent whole. While we have identified studies that apply robust models to elements of DWI behavior (e.g., Beck's study of attitudes) or to countermeasures, we have not yet found a document that attempts to encompass the entire process.

It is our position that the performance of any research effort is enhanced when the effort is placed in context. Before one can attempt to measure knowledge on an issue, for example, one should know why that knowledge is needed, the likelihood that it can be employed, the circumstances that will make it valuable (or the opposite), and so on. Thus, we would like to establish a theoretical context within which the current work on ascertaining public perceptions of alcohol impairment and its implications for driving performance may be viewed.

The PRECEDE Model

The PRECEDE model (Green et al. 1980) provides a framework for planning health education programs. Green et al. define health education as "...any combination of learning experiences designed to facilitate voluntary adaptations of behavior conducive to health." Their model takes as its principle that the planner or evaluator should start with the highest goal one can define (quality of life) and work backward through the chain of influences by which the planned action will affect this overall goal. We believe that this model provides valuable insight into DWI behavior and the eventual modification of such behavior.

**FIGURE 3
THE PRECEDE FRAMEWORK**



A quick schematic of the PRECEDE model is shown on the following page. The model emphasizes that the health planner should place intended programs squarely within a larger context that includes both the relationship of the behavior to the problem it is intended to correct and the influence of factors external to the behavior itself on ultimate outcomes. Three variables are seen as influencing behavior: predisposing, enabling, and reinforcing factors. ("PRECEDE" is an acronym for Predisposing, Reinforcing, and Enabling Causes in Educational Diagnosis and Evaluation.) Predisposing factors are characteristics of the individual that incline him or her to choose a particular course of action. They include knowledge, attitudes, values, and perceptions surrounding the action. Enabling factors are those circumstances that permit the individual to carry out the desired behavior. For example, in order for an individual who has been drinking to avoid driving, alternate transportation (e.g., friend, mass transit, walking) must be available. Reinforcing factors refer to the behavior of those with whom the individual comes into contact while attempting to carry out the behavior in question.

PRECEDE and DWI

Examining DWI in light of the PRECEDE model helps us place the planned work on examining and improving knowledge of alcohol impairment in a complete context. The health problem that adversely affects overall quality of life is vehicular crashes, with associated death, injury, and property damage. A major behavioral course of this health problem is driving while intoxicated. Thus, we wish to induce drivers and passengers to avoid this behavior.

Predisposing factors. Predisposing factors include knowledge of and attitudes toward driving while impaired. The importance of each of these is illustrated if one considers the series of decisions necessary for the individual to determine whether he or she should drive after drinking:

o Knowledge:

- What is the extent of my impairment?
(Should that be measured by BAC, counting of drinks, behavioral assessment?)
- What level of impairment is so severe that one should not drive?
- Is my level of impairment above or below the safe level?

o Attitudes:

- Is impairment the same as being drunk?
- Is being drunk desirable or undesirable?
- Are the alternatives to driving (asking for help, cabs, public transit) more or less attractive than driving?
- How important are the legal consequences of DWI?

As the previous review showed, knowledge of the effects of alcohol is less than adequate among the general population. One study found that a substantial minority believed "experience" is the most important factor influencing the amount one can drink (Arizona 1979, cited in Korenbaum). It was suggested that this common misconception follows from two circumstances: the ability of motivated drinkers to control socially conditioned responses to alcohol such as excess amusement, and the ability of experience drinkers to compensate for small amounts of alcohol more effectively than inexperienced drinkers. Considerable education is still needed to inform the public that excessive alcohol will always impair neuromuscular performance and that this impairment severely reduces driving performance.

Social aversion to drunkenness may be a significant attitudinal barrier to admission that one has drunk too much to drive. While drinking is a neutral activity, and mild effects of alcohol receive only mild disapproval, there is strong disapproval of drunkenness. The more carefully designed public education campaigns scrupulously avoid the phrase "drunk driving." Nonetheless, the media and many well-intentioned local programs use this phrase so often that it is in common usage. In addition to the other negative connotations of admitting diminished capacity, the individual who determines that he or she should not drive in effect classifies himself or herself as "drunk." Reducing this dichotomous situation (drunk/not drunk) by placing alcohol impairment in a neutral light could serve to reduce the social pressures that prohibit the "ordinary" individual from admitting that he or she should not drive after drinking.

Resolution of the dichotomy between the "drunk driver" and "I, who have been drinking" is a delicate social task. The "drunk driver" image has been--and continues to be--promoted to encourage support for more severe penalties for drunk driving. For example, a pamphlet being distributed by the Allstate Insurance Company as part of its educational materials emphasizes that the drunk driver is a "problem drinker," as compared to the "85 percent" of all drivers who are "abstainers or light-to-moderate drinkers." Differences between the drunk driver and the ordinary citizen are presented to emphasize that the former is a distinct category of person, deserving of punishments that the citizen might not deem appropriate for someone similar to himself: "Stricter legislation and programs to curb drunk driving are not aimed at this group (responsible drinkers)." (Allstate, no date)

The value of promoting the "drunk driver" picture depends on the goals being sought. To the extent that deterrence is the principal and most effective weapon against DWI, and severe punishment an important part of deterrence, characterization of the "drunk driver" as a specific class of individual is an effective social strategy. Citizens are generally more willing to support countermeasures when there is little likelihood that these will be applied to them personally (Vayda and Crespi 1981). However, since penalties are already perceived to be more severe than they are, the efficacy of penalties as a deterrent may be questioned. (There is evidence, however, that perceived enforcement has a strong deterrent effect.)

If one wishes to change the drinking/driving behavior of a broad class of people, it may be argued that emphasizing differences between "drunk drivers" and "the rest of us" is counterproductive. As noted above, disapproval of drunk driving is near universal, but driving after drinking too much continues. When as many as 30 percent of a population (as is the case with men) admit to a behavior, there is a serious absence of consensus concerning either the action or its seriousness.

Improved public knowledge of the various ways in which alcohol can impair performance of skills crucial for driving, and the limits to compensation for these neuromuscular effects, is essential. In addition, the role of commonly used behavioral labels must be noted.

To effect a major change in the behavior of ordinary citizens, NHTSA and others involved in alcohol education will have to communicate two messages:

- o levels of consumption short of "drunkenness" are dangerous, and
- o admission of impairment is not an admission of drunkenness, but rather a responsible action proving that the person is not drunk.

While attitudes toward admission of drunkenness are probably the primary attitudinal barrier to acting responsibly with regard to alcohol impairment, attitudes toward alternatives to driving must not be discounted. For a young person who has had the privilege of driving for only a short time, reverting to public transportation (if there is any) may imply failure at adult responsibilities as well as being inconvenient. Further, available mass transit may be perceived as more dangerous than driving. Asking a friend to provide assistance may be viewed as acutely embarrassing. Finally, attitudes toward possible sanctions for DWI will vary. The significance of an arrest or conviction are not the same in all segments of society. A person without a job, for example, will not worry about losing a job if his or her license is suspended.

Working through this logic is not an academic exercise. Contract tasks are to examine alcohol impairment, to study current understanding of alcohol impairment among judicial system actors, and to develop materials that communicate correct information on impairment to those actors. Review of what is currently known about attitudes toward impaired driving behavior places these tasks in context. There is clearly a need to communicate that alcohol impairment is serious and may not always be visible. Misconceptions concerning alcohol's effects and individual ability to compensate for these effects are widespread. We believe that it will also be necessary to separate the frequently confused concepts of "impaired" and "drunk." When impairment is recognized as a significant physiological condition, and not a comment on the offender's social status, universal application of existing DWI laws will be enhanced. Further, neutral concepts such as "impairment" allow responsible drinkers to avoid driving without applying socially undesirable labels to themselves.

Enabling factors. One of the principle advantages of the PRECEDE model is its inclusion of enabling factors. If there is a public desire to reduce the number of individuals who drive while impaired, a means of avoiding the behavior

must be provided. This need is recognized in local programs offering free rides for those who feel themselves unable to drive.

Examination of enabling factors is not within the scope of the present contract, which focuses on knowledge of DWI among judicial officials and the public; however, such factors must be taken into consideration if any major public education campaigns are developed.

The importance of enabling factors is difficult to state accurately. In the absence of any alternatives to driving after drinking, the driver has little recourse: he or she will drive while impaired. This extreme situation, however, is rarely the case. For most communities, it is likely that alternatives to driving while impaired are available at some cost to the driver. For example, if the bars are closing in Maine and the driver is alone, he or she may face a long wait in the cold, perhaps followed by a high taxi fare, in order to avoid driving while impaired. The activity is feasible but requires motivation. Public education efforts should ideally be paired with programs that increase both the actual and the perceived availability of alternative transportation. It is our belief that the social acceptability of alternative transportation will be enhanced if its use is promoted as part of responsible drinking--a sign that one is not drunk but rather capable of acting rationally.

Reinforcing factors. The consequences of driving while impaired may reinforce or fail to reinforce prohibitions against this activity. The principal positive consequence of driving while intoxicated is safe arrival at one's destination with a minimum of inconvenience. Given the low probability of adverse results from any single instance of DWI, this positive reinforcement is quite prevalent.

There are numerous negative reinforcing factors associated with driving while impaired. In roughly ascending order of probability, the potential negative consequences of DWI are death (one's own or that of others), injury, minor accident, conviction of DWI with legal and insurance sanctions, arrest for DWI, and social disapproval of one's behavior. The driver's perception of the likelihood of these negative consequences influences the drinking/driving decision.

The current contract, by exploring the knowledge judges, prosecutors, and jurors have of alcohol impairment and devising ways to communicate accurate information, will act to increase the probability that arrest for DWI will result in conviction with its attendant sanctions. We believe that separating the notion of "impairment" from the notion of "drunk" will influence judicial behavior as well as individual decisions. When impairment is more accurately defined, it will become more evident that the courtroom defendant need not meet the stereotype of a "drunk" to have committed the infraction of DWI.

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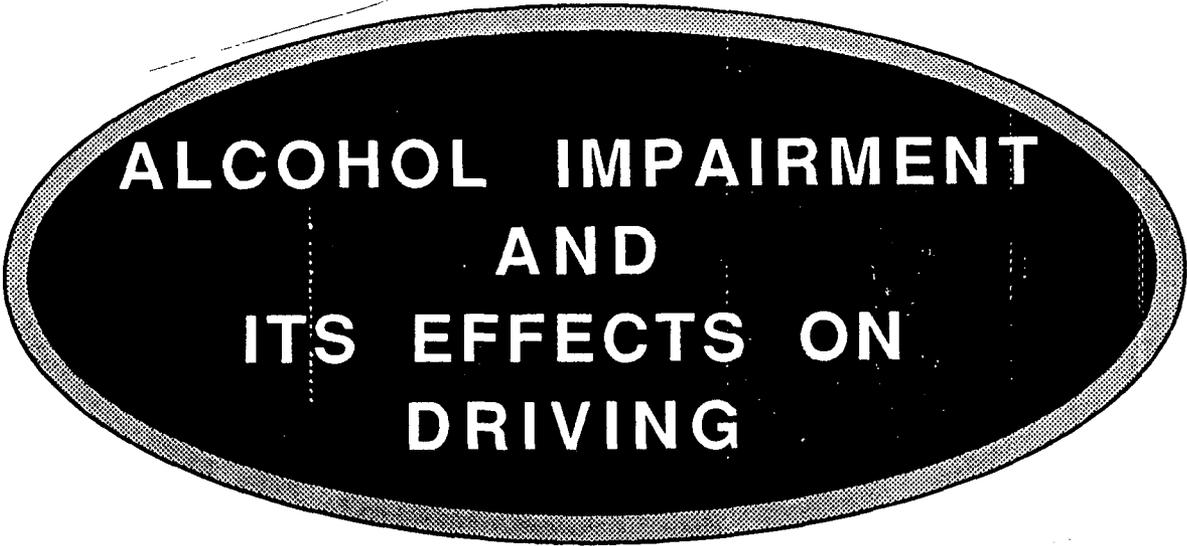
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APPENDIX C

**"Alcohol Impairment and Its
Effects on Driving"**



**ALCOHOL IMPAIRMENT
AND
ITS EFFECTS ON
DRIVING**

An Informational Booklet

***U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
400 SEVENTH STREET, S.W.
WASHINGTON, D.C. 20590***

A. INTRODUCTION

Laws against driving while intoxicated (DWI)¹ are intended to reduce the risk to public safety created by a person who chooses to drive after having drunk to the point of intoxication. While the precise legal definition of intoxication varies from state to state, all DWI laws are based on three common understandings:

- Alcohol impairs driving performance.
- The amount of impairment depends on the amount of alcohol in the body, which can be measured using various devices.
- The legally intoxicated driver is a risk to public safety.

Over the years, extensive scientific research has shown how driving abilities are impaired by alcohol and has documented the crash risk of intoxicated drivers. This booklet summarizes current knowledge of the manner in which alcohol reduces driving abilities and the crash risks it creates.

B. ALCOHOL AND THE HUMAN BODY

What's in a Drink?

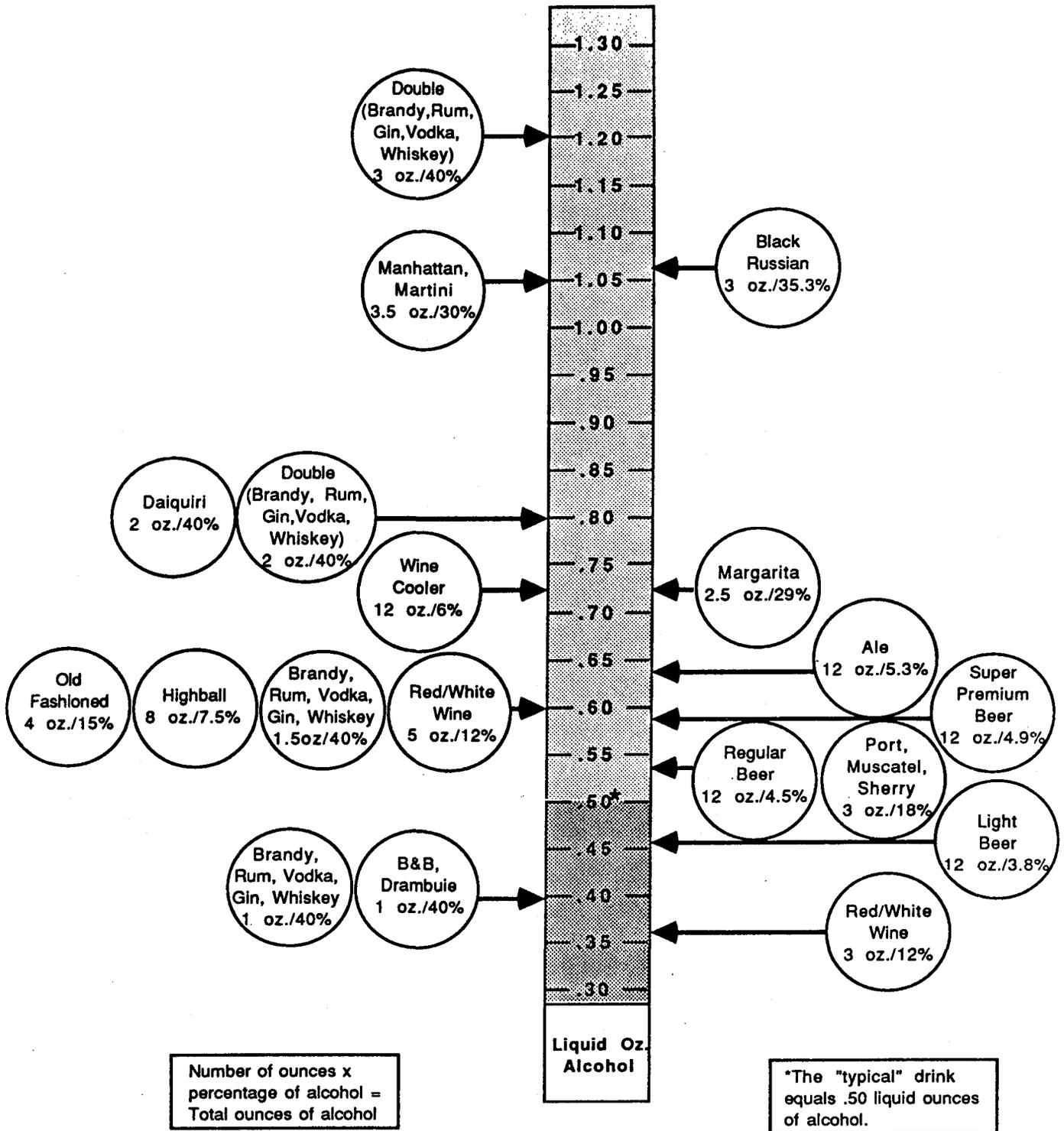
Although alcoholic beverages come in a variety of colors, flavors, and bouquets, their common active ingredient is alcohol (ethanol). This is true for distilled spirits, wine, and beer.

As illustrated in Figure 1, however, all alcoholic beverages are not the same in terms of alcohol content. There can be considerable variation in alcohol content among types of beers (light, regular, superpremium, and ales), wines (table, fortified, and wine coolers), and mixed drinks. Drinks that mix more than one shot of liquor, such as Martinis and Black Russians, have a higher total alcohol content. One Martini is equal to 1.75 glasses of wine or nearly 2 beers.

A "typical" drink contains just over one half (.50) ounce of pure alcohol. "Typical" drinks are one shot of whiskey (1 1/2 ounces of 80-proof² liquor), one

¹ Laws concerning driving after excessive drinking use different terms in different states: driving while intoxicated, driving under the influence of alcohol, driving while impaired by alcohol, and so on. For convenience, the term driving while intoxicated, abbreviated DWI, is used here.

² The "proof" value of liquor translates to "percent of alcohol" at half the proof amount. For example, an 80 proof drink contains 40% alcohol.



**FIGURE 1
ALCOHOL CONTENT OF VARIOUS ALCOHOLIC BEVERAGES**

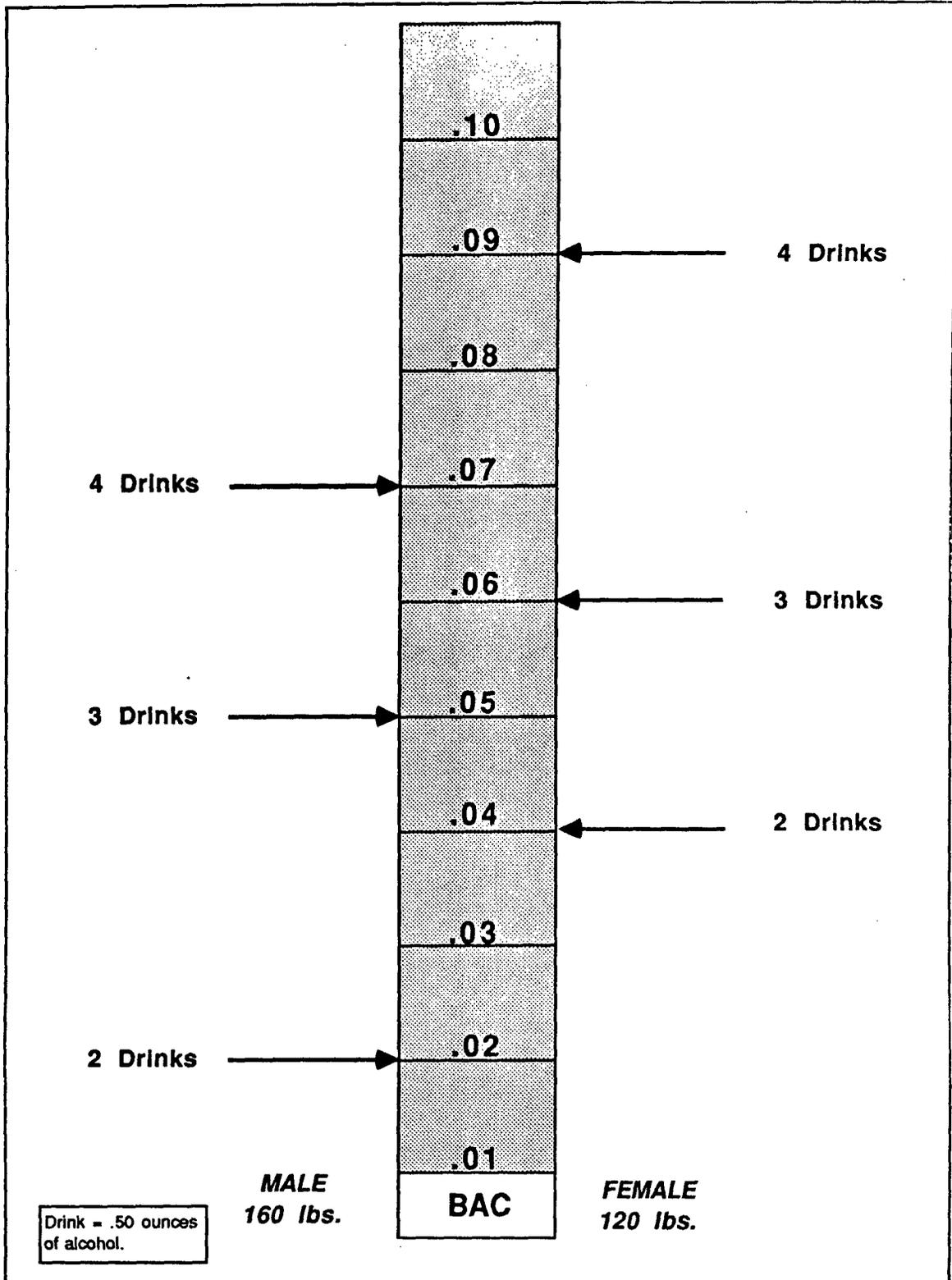


FIGURE 2
NUMBER OF DRINKS AND BAC IN ONE HOUR OF DRINKING

different abilities must be used simultaneously. In fact, research findings suggest that the most crucial aspect of alcohol impairment is reduction in the driver's ability to handle several tasks at once, i.e., time sharing. In some skill areas, performance of a single task may remain relatively unchanged even at BAC levels up to 0.08%, because the person is focusing all of his or her attention on the task at hand. However, when two things must be handled simultaneously, as in driving, even small amounts of alcohol produce impairment.

- **Reaction Time.** The ability to react to sudden events on the road is clearly important to successful driving. Scientists study two types of reactions: **simple reaction time** and **choice reaction time**. In the first case, the person being tested only needs to respond to a signal, while in a choice reaction test he or she must choose the correct response from several possible alternatives. Impairment of simple reaction time begins at 0.04% BAC, while choice reaction time is impaired slightly earlier, at 0.03% BAC. Analyzing these results, scientists have found that alcohol lengthens the time required to decide what to do, with the time required to physically implement the decision changing only slightly. The end result, however, is an increase in the total time required to respond to a situation.
- **Tracking.** Many people point to "weaving," or the inability to keep the car on the road, when describing the driving of an individual who has been drinking. Keeping the car on the road is a **tracking** task. The driver continuously observes, or tracks, the position of the vehicle with respect to the road and keeps the vehicle in the correct location. Scientists have found that tracking is impaired at BAC levels of 0.05%. If two objects are being tracked at once, however, as when the driver must allow for other vehicles in addition to his or her own, performance is reduced at BAC levels below 0.05%.
- **Vision.** It has been estimated that people acquire about 90 percent of all their information through vision. The evidence suggests that low or moderate doses of alcohol do not produce impairment of such visual functions as static acuity (how clearly one can see), darkness adaptation, or peripheral vision. However, **dynamic visual acuity** (the ability to perceive detail in an object in motion) suffers at BAC levels below 0.05%. Control over eye movement and the ability to merge two images into one also show impairment at BAC levels below 0.05%.
- **Comprehension.** The ability to perceive hazards on the road requires both receiving information (i.e., seeing and hearing), and processing that information in order to determine its meaning or importance to what is currently happening. Impairment in the time it takes the brain to understand what it has perceived is present at 0.05% BAC.
- **Attention.** Scientists test attention levels by giving volunteers a task that requires alertness over an extended period of time.

Volunteers might be required to listen for a signal that occurs at irregular intervals over a period of one or two hours, for example. The ability to focus on a single task, called **concentrated attention**, is impaired at 0.08% BAC. Situations that require concentration on two or more tasks are referred to as **divided-attention tasks**. Significant impairment of divided-attention performance is present at BACs of 0.05%. As the number of demands placed on attention increases, less alcohol is needed to produce impairment.

- **Coordination.** Studies indicate that BACs of 0.05% impair tasks which require skilled motor performance and coordination. The onset of impairment appears to vary with the difficulty of the task--with tasks which require high levels of precise movement likely to be impaired at lower BACs.
- **Road Test Performance.** In driver performance tests involving a mix of simulator and closed course settings, a BAC level of 0.08% has been shown to impair accuracy of steering, braking, speed control, lane tracking, gear changing, and judgments of speed and distance.

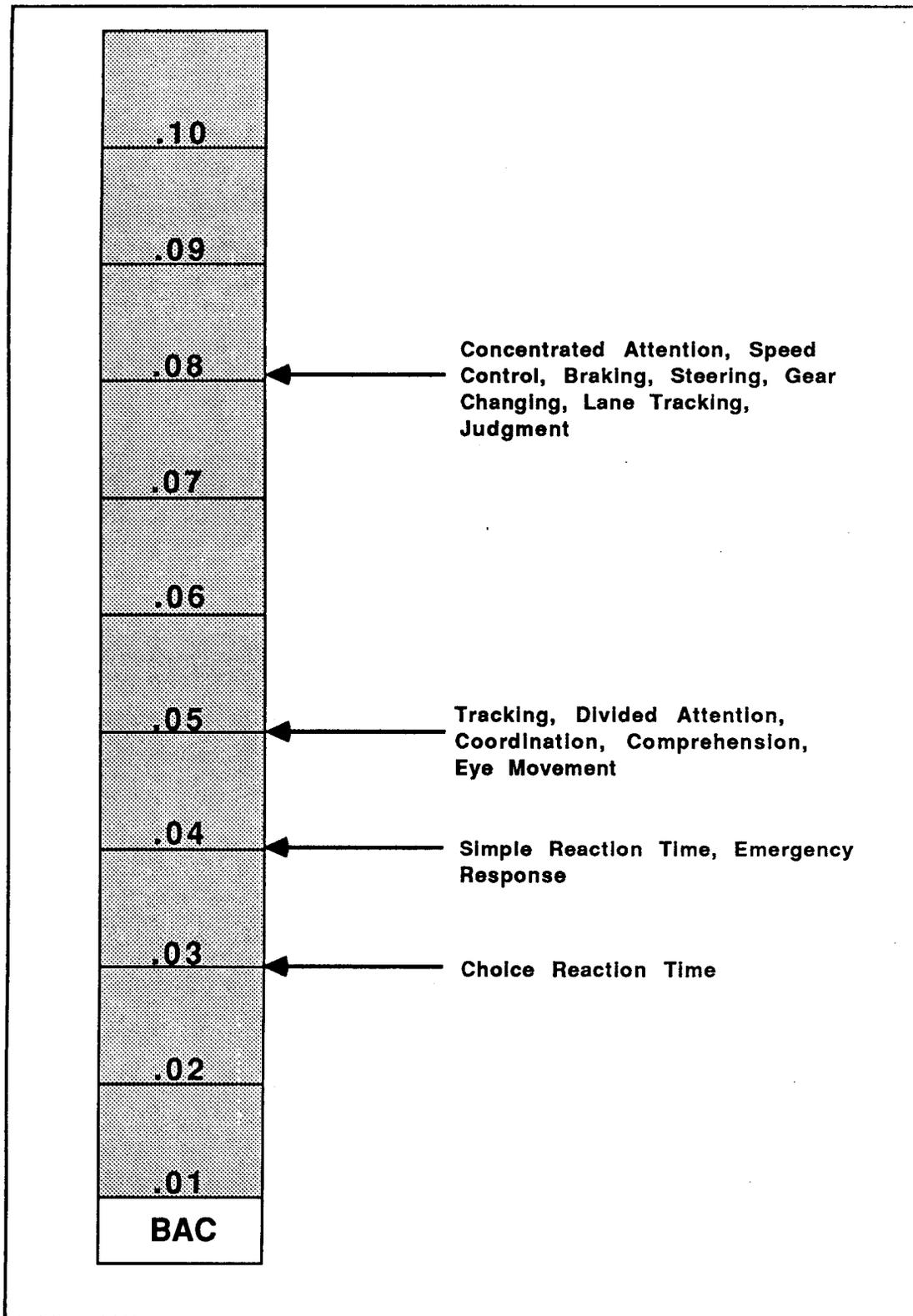
Because performance tests are expensive, they have primarily been carried out at legally significant BAC levels (in the area of 0.08 to 0.10% BAC). It is likely that some effects of low alcohol levels on driving performance may not yet have been documented.

- **Emergency Response.** Recent research involving a closed-course test of driving performance included simulated emergencies. In this test, BACs of 0.04% were found to impair response to the emergency situation. Alcohol reduces the drinker's ability to handle more than one task at a time. The driver who is affected by alcohol is able to concentrate on controlling the vehicle, but is then less able to scan for and respond to emergencies.

As illustrated in Figure 3, a great deal of impairment has occurred well before the driver has reached the legal BAC limits of 0.08 and 0.10%. In general, the more complicated skills are impaired first, such as being able to divide one's attention between the road and the car (divided attention), or observing traffic signals and deciding what to do (comprehension). The driver's limitations may not become evident unless or until a test situation occurs.

D. BREATH ALCOHOL ANALYSIS

The quantity of alcohol in a driver's body can be measured by tests of the blood, breath, urine, or saliva. Breath analysis, which requires no medical assistance and affords precision measurement, is the primary choice of law enforcement agencies.



**FIGURE 3
BAC AND IMPAIRMENT**

Accuracy Levels Required for Breath Testing Devices

There are a number of devices available for breath testing. To assist the states in their selection, the National Highway Traffic Safety Administration (NHTSA) tests such products. To be placed on the "conforming products list," a breath measuring device must be accurate to plus or minus 0.005% when tested at the 0.10% BAC level. This level of accuracy must be maintained during variation in the power supply and temperature. Units intended for mobile use, as in police vans, must also be accurate after having been exposed to vibration.

Each breath testing device must be calibrated at regular intervals in order to ensure that it remains accurate. Police officers are required to maintain logs indicating that devices in their jurisdiction are checked as required before being used to test drivers.

Issues in Breath Testing

Some states base their DWI laws directly on breath test readings. Other states retain the old form of the law, which defines the offense only in terms of blood alcohol concentration. In these latter states a conversion table, based on the average ratio of the concentration of alcohol in deep-lung breath to that in the blood, is used to go from a breath test result to the blood alcohol level. In practice, typical police collection procedures generally do not obtain deep lung air, with the result that breath tests underestimate blood alcohol values by 10 to 20%. Thus, if a DWI suspect has a calculated BAC of 0.10% based on breath testing, his or her BAC measured through blood testing may be as high as 0.12%.

People often wonder whether substances other than alcohol may register as alcohol on a breath-testing device, causing a false reading. While this possibility exists, it is minimal in a correctly administered test. Two potential sources of incorrect readings are tobacco smoke in the lungs and regurgitated alcohol in the mouth. Police officers generally avoid both of these complications by careful testing procedures. A third, but rare, potential source of error is the presence in the blood of substances chemically similar to alcohol, such as acetone. Acetone is a product of the metabolism of fat. It may be present in the blood of alcoholics whose alcohol problems have led to severe nutritional inadequacy and may also be present in the blood of diabetics. Erroneous readings caused by the presence of acetone in the blood are rare for two reasons. First, more devices in use today, unlike those of 20 years ago, have been designed to distinguish between alcohol and chemically similar substances. Second, the number of individuals with high levels of acetone in their blood is very low. A recent NHTSA study found a rate of 2.8 such persons in 10,000 DWI suspects.

E. THE RISK ALCOHOL ADDS TO DRIVING

Several studies have explored the effects of alcohol on the risk that a driver will be involved in a crash. These studies have found that the risk of being in a crash begins to rise between 0.04% and 0.05% BAC and increases very rapidly at BAC levels of 0.06% and above. As seen in Figure 4:

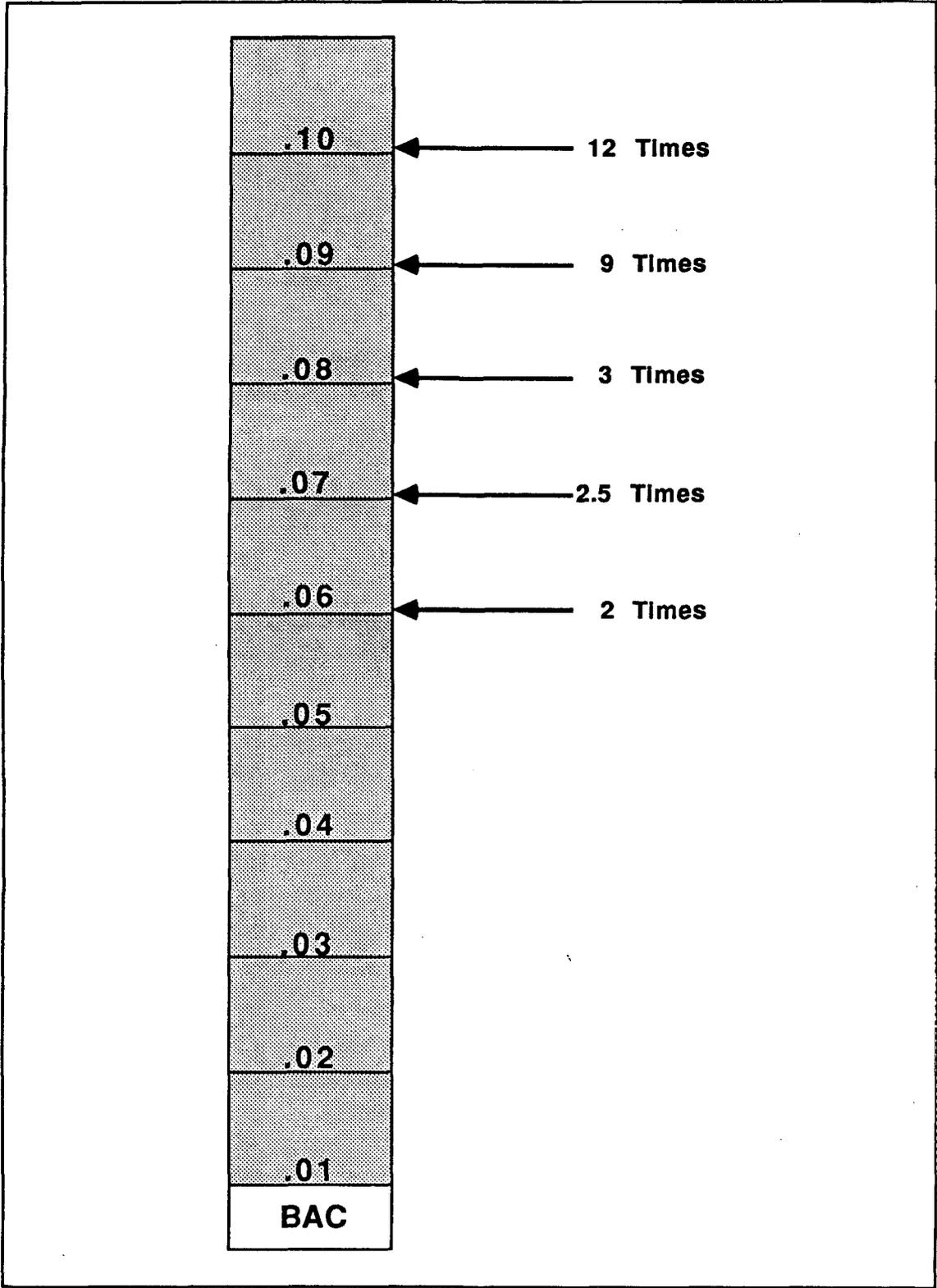


FIGURE 4
BAC AND CRASH RISK

- Drivers with a BAC of 0.06% are twice as likely to be involved in a fatal crash as drivers who have not been drinking.
- Drivers with a BAC of 0.10% or more are 12 times more likely to be involved in a fatal crash.

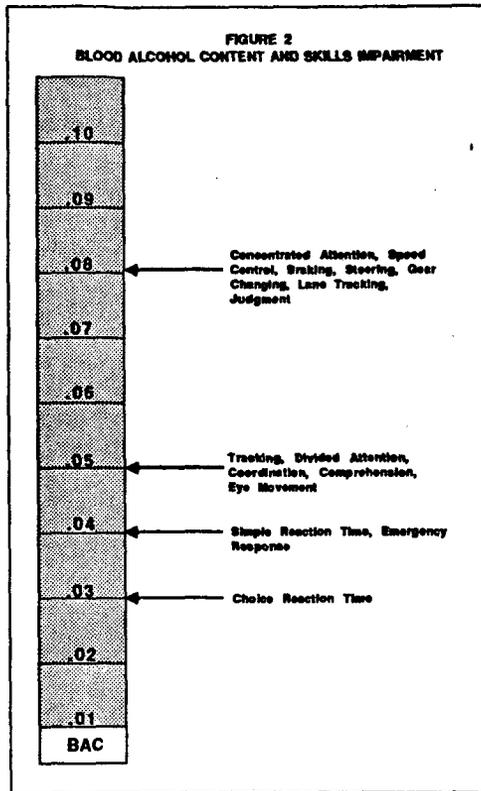
In addition, the higher the BAC level of the driver, the higher the probability that he or she will have been the party at fault in a crash. Thus, legally intoxicated drivers are not involved in more crashes through simple bad luck, but are likely to cause the crashes in which they are involved.

The DWI level is currently 0.10% BAC in the majority of states. However, 0.10% BAC is not the point where impairment begins. Rather, 0.10% BAC is the point at which impairment results in prohibitive crash risks.

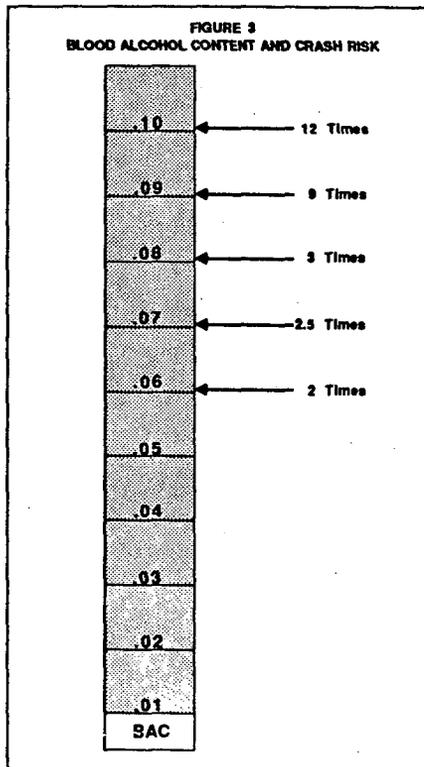
F. CONCLUSION

That alcohol impairs driving ability is not disputed. It is, however, becoming increasingly evident that alcohol impairs driving ability at lower BAC levels than previously believed. As driving is comprised of a number of separate tasks, impairment occurs at various BAC levels for various driving skills. The cumulative effect is a crash risk dangerously high for society.

APPENDIX D
"Every Drop Counts"



What's more, the higher the BAC level of the driver, the higher the probability that he or she will have been at fault in a crash. Intoxicated drivers are not just unlucky; they cause the crashes in which they are involved.



WHAT'S THE RISK?

The risk of being in a crash begins to rise between .04% and .05% BAC, and increases rapidly thereafter, as shown in Figure 3.

By the time a driver reaches a BAC of .06% he or she is twice as likely to be involved in a fatal crash as a non-drinking driver.

By the time a driver reaches a BAC of .10% he or she is 12 times more likely than a non-drinking driver to be involved in a fatal crash.

For more information or copies of this pamphlet, write to:

"Every Drop Counts"



NHTSA
Alcohol Programs Division
NTS 21
400 Seventh Street, S.W.
Washington, D.C. 20590

EVERY

DROP

COUNTS

ALCOHOL AND DRIVING IMPAIRMENT

U.S. Department of Transportation
National Highway Traffic Safety Administration

A few drinks, but still able to drive? Many people think so. They're wrong. Research now shows that alcohol impairs driving ability at lower blood alcohol levels than previously believed.

This pamphlet explains how alcohol reduces driving abilities and increases your risk of a crash.

WHAT'S IN A DRINK?

A "typical" drink, such as a can of beer, a glass of wine, or a shot of liquor, contains just over one half ounce of pure alcohol. However, many drinks contain more alcohol than the "typical" drink.

Some popular drinks and their "typical" drink equivalencies are as follows:

Martini, Manhattan, Black Russian
= 2 Typical Drinks

Margarita, Daiquiri, Ale, Wine Cooler, Double
= 1.5 Typical Drinks

Beer, Wine, Sherry, Highball, Liqueur
= 1 Typical Drink

WHAT IS BAC?

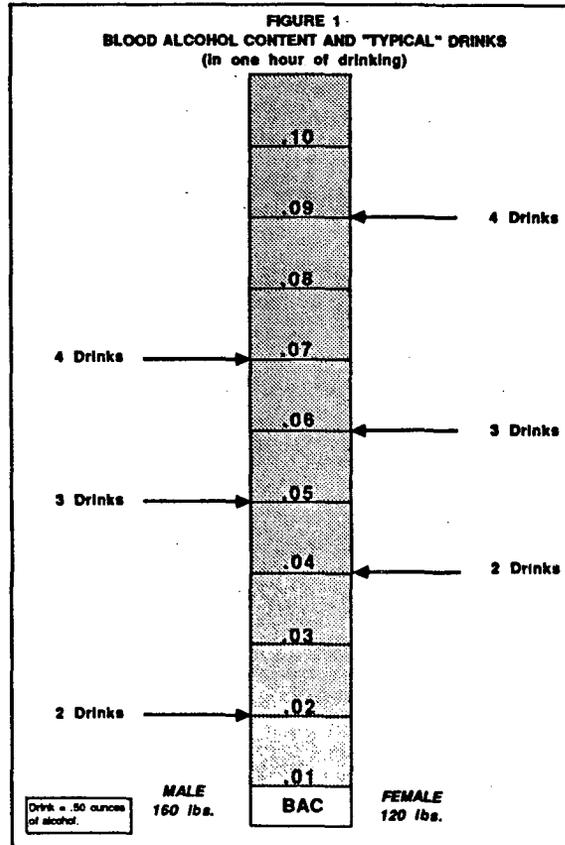
Blood alcohol concentration, or BAC, is a measure of the amount of alcohol in the body. Blood alcohol is measured directly through testing blood, or indirectly through tests that use breath, urine, or saliva.

Most states consider a person too intoxicated to drive when his or her BAC reaches .10%. At a BAC of .10%, there is roughly one drop of alcohol in the blood stream to every 1,000 drops of blood.

Many factors affect an individual's absorption of alcohol. These include weight, sex (a higher proportion of a woman's body weight is in fat and fat absorbs less alcohol

than muscle tissue), amount of food in the digestive tract, and time spent drinking (and the corresponding rate of elimination).

BAC levels and the number of "typical" drinks required to reach them can be roughly estimated, as shown in Figure 1. As seen here, after drinking three drinks in one hour, a male of 160 pounds will reach a BAC of .05% and a female of 120 pounds will reach a BAC of .06%.



WHAT BACs ARE UNSAFE?

Most people will be obviously drunk at .10% BAC. Some drinkers can appear to be in control of themselves, but they nevertheless have lost crucial driving abilities, as illustrated in Figure 2.

Reaction Time. Simple reaction time is impaired at .04% BAC. When the driver must choose from a number of responses (choice reaction), impairment begins at .03% BAC.

Tracking. Monitoring of your car's position on the road is an example of tracking. The ability to track a single object is impaired at .05% BAC. If two or more objects must be tracked at once (your car and another's), performance is reduced at even lower BACs.

Attention. A person can concentrate on a single task at BACs as high as .08%. But, if the driver must divide his or her attention between tasks, impairment is present at .05% BAC or even lower.

Comprehension. An increase in the time it takes the brain to understand what it has seen or heard occurs at .05% BAC.

Vision. Control over eye movement and the ability to merge two images into one show impairment at .05% BAC. The ability to perceive detail in an object in motion also suffers at .05% BAC.

Coordination. BACs of .05% impair tasks which require highly controlled muscular movements, such as coordination of hands and feet.

Road Test Performance. In driver performance tests, a BAC of .08% impairs accuracy of steering, braking, speed control, lane tracking, gear changing, and judgments of speed and distance. Ability to respond to emergencies is impaired at .04%.